EXPANDED SITE INVESTIGATION

DEAD CREEK PROJECT SITES

AT CAHOKIA/SAUGET, ILLINOIS

FINAL REPORT

VOLUME 2 OF 2

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APPENDIX A

DESCRIPTION OF CURRENT SITUATION
AT THE
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I. INTRODUCTION

The RI portion of the Dead Creek Project Remedial Investigation/Feasibility Study, as described in the Project Work Plan, includes eleven tasks to be completed. Task 5, Description of Current Situation, calls for Ecology and Environment, Inc. to prepare a description of the background information pertinent to the area and its problems and outline the purpose and need for remedial investigation in the area.

This report was prepared to provide the information on and a description of the current situation of the sites in the Dead Creek Project area. The report is organized to provide an area wide description followed by a detailed site by site description. The site by site description provides a detailed presentation of all available information concerning each site, which was acquired and evaluated during Tasks 3 and 4 of the RI.

II. GENERAL DESCRIPTION OF PROJECT AREA

Location

The Dead Creek Project area is located in and around the cities of Sauget (formerly Monsanto) and Cahokia in St. Clair County, Illinois (Figure 1). Under the scope of the RFP issued by the IEPA, the study area consists of 18 suspected uncontrolled hazardous waste sites located throughout the study area (Figure 2). The project area consists of 12 individual sites and 6 additional sectors in Dead Creek.

Areal Description and Topography

The sites to be investigated as part of the Dead Creek Project are in an area which contains a mixture of industrial, residential, commercial, farm, and undeveloped land. The sites consist of closed and active landfills, industrial property, undeveloped or currently unutilized land, residential land, and an areal drainage flowpath (Dead Creek).

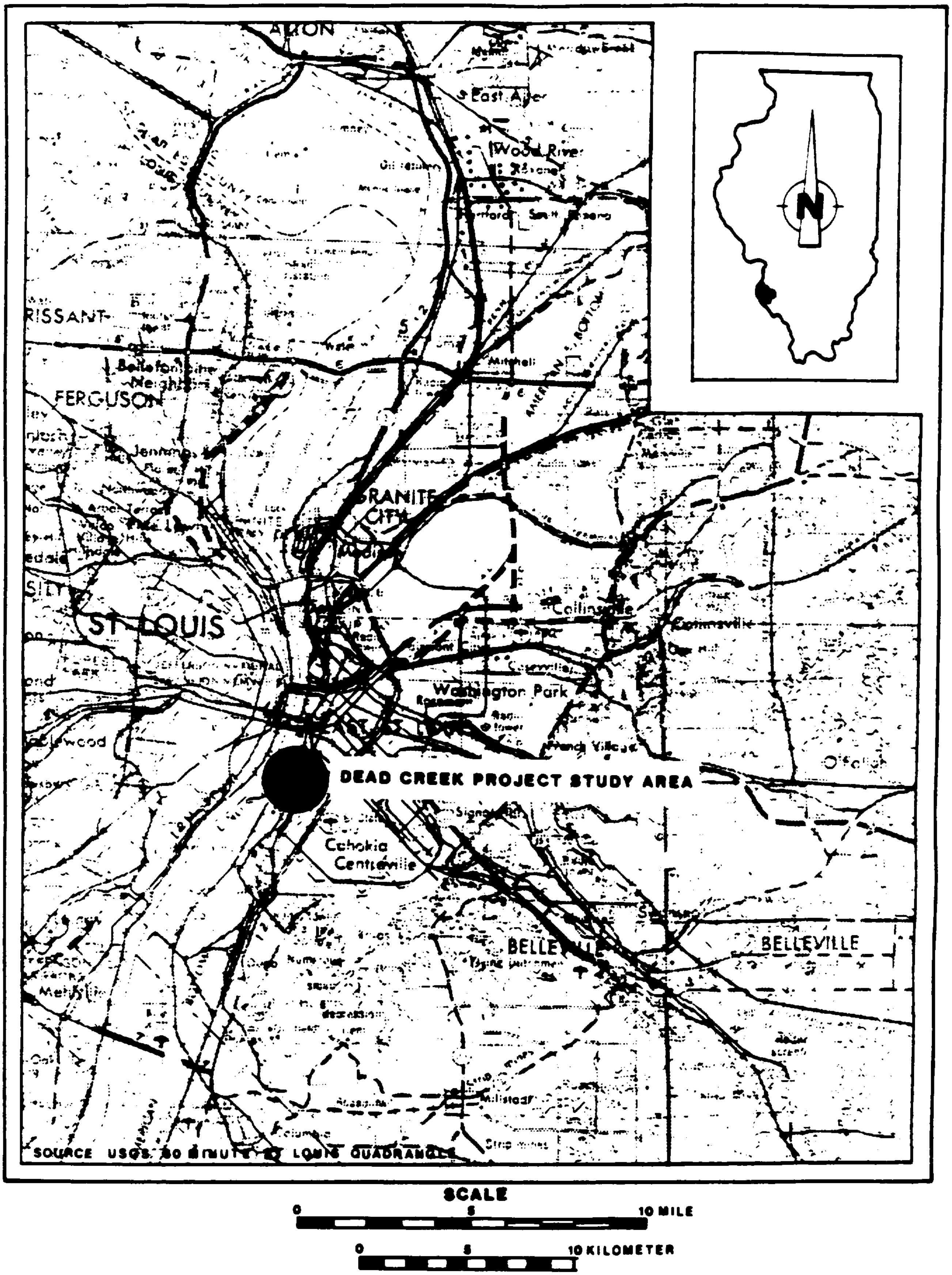


FIGURE 1
DEAD CREEK PROJECT SITE LOCATION MAP

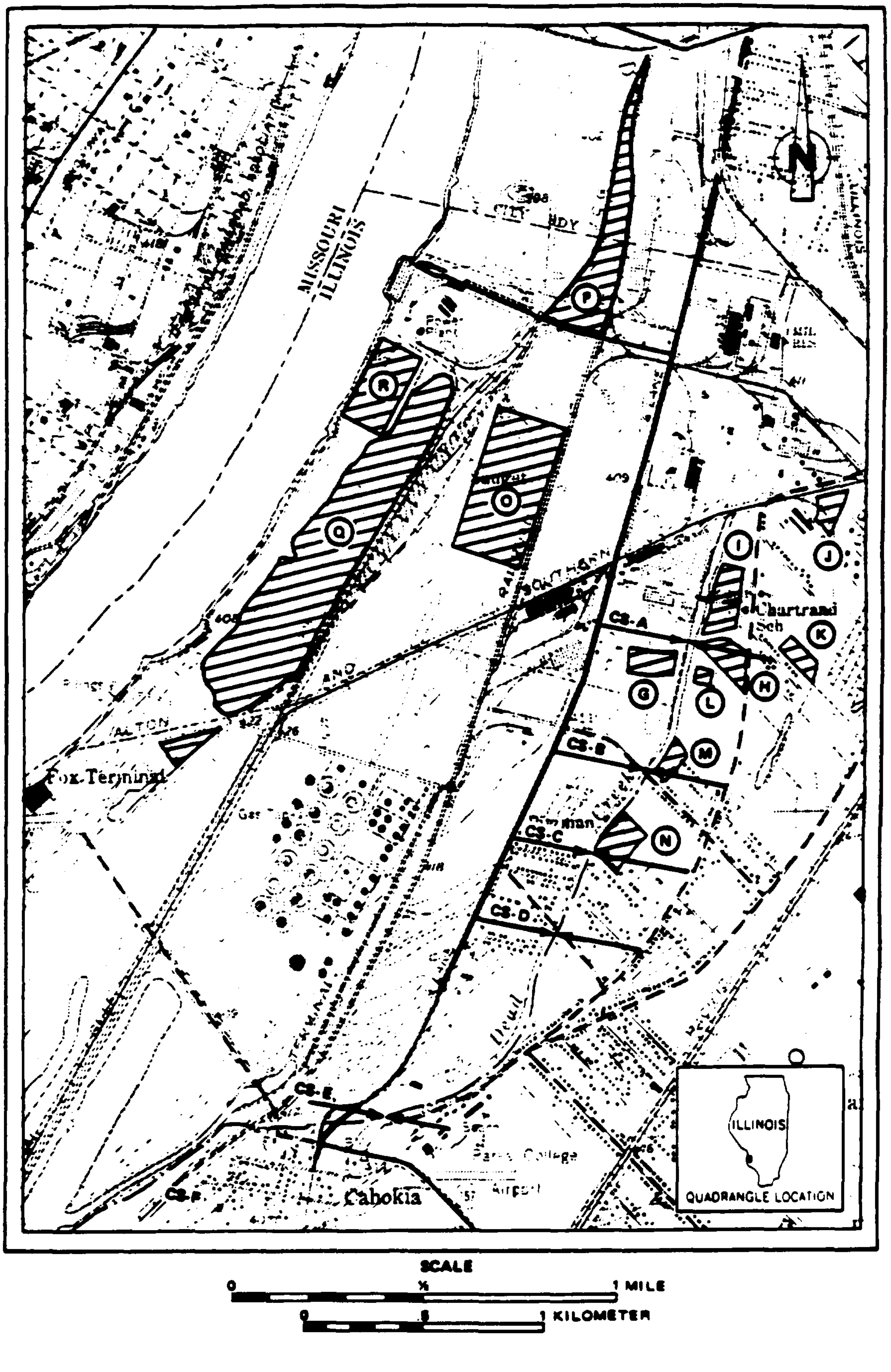


FIGURE 2
SITE REPORTING DESIGNATIONS FOR THE DEAD CREEK PROJECT

The project area is situated within the floodplain of the Mississippi River in an area known locally as the American Bottoms. Topogr·ɔhy in the site area is controlled by structural features of the bedrock which resulted from glacial and fluvial occurrences. The Mississippi River meandered over the American Bottoms floodplain between the upland bluffs, which form the floodplain boundaries, prior to the establishment of the present channel. The meadering of the river has given rise to typical floodplain characteristics throughout the study area. These features include low, broad, flat, swampy areas; terraces (generally found north of the study are); curved ridges and swales (typified as meander scars) formed as slack water bars or channels; alluvial fans; wetlands vegetation (although all vegetation is generally sparse due to industrialization and urbanization); mounds; and crescent shaped ox-bow lakes. The shifting of the Mississippi River channel has resulted in heterogeneous interbedding of fine and coarser material in the surficial flood plain deposits. Material has also been transported to the flood plain from the uplands and from the bluffs by overland flow which has resulted from rainstorms.

As in the case of most flood plains, the American Bottoms area is not perfectly flat. Many slight, naturally occurring and manmade, irregularities exist. However, in general the land surface at the site area is 400 feet above mean sea level. The land generally slopes from north to south and from the east toward the river. The wide floodplain area (approximately 6.5 miles across in the site area) exhibits little topographic relief except in the adjacent bluffs and upland areas which tend to be high (up to 150 feet above floodplain levels), steep, and moderately well drained. The local average land scope in the site area is 0.06% to the west. Regional floodplain slope is 0.0059% to 0.009% to the south (Fenneman, 1909; Jacobs, 1971).

Topographic maps for the study area were developed as part of Task 3 of the Remedial Investigation. The topographic maps are included as an attachment to this report, and an Index Map, Figure 3, depicts the

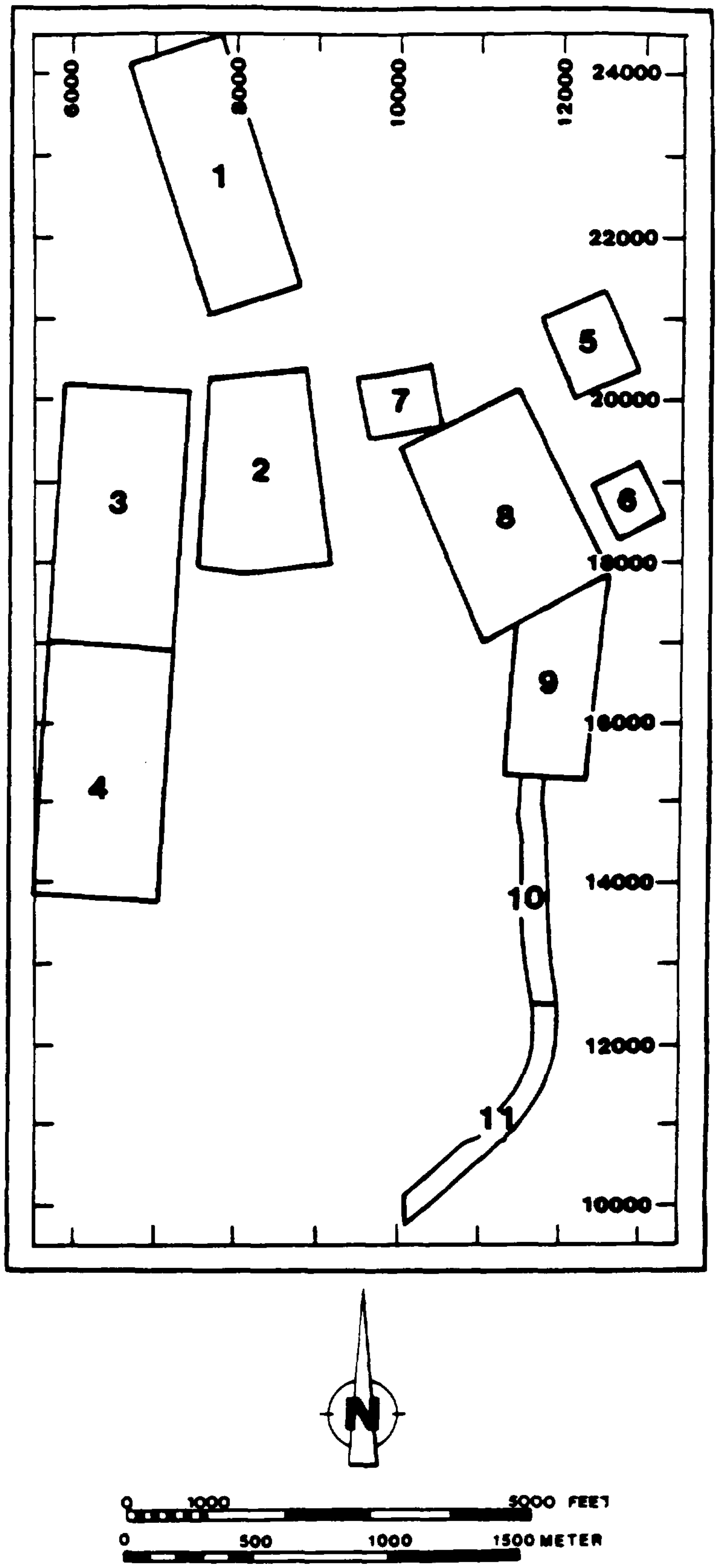


FIGURE 3
BOUNDARIES OF ENGINEERING PLATES FOR THE DEAD CREEK SITES

areal relationships of the topographic maps.

Climate

The climate in the site area is generally described as continental with hot, humid summers and mild winters punctuated by extremely cold periods of short duration. The site area is located in a major frontal convergence zone where warm, moist air from the Gulf of Mexico meets cold, dry air from Canada. This convergence zone produces a variety of rapid changes in weather conditions.

The 80-year average precipitation reported by Keefe (1983) was 35.4 inches per year, although the yearly average over the last 25 years (same data base) was up slightly to 39.5 inches per year. June is normally the wettest month, with an average of 4.3 inches of rain. Much of the summer rainfall is produced by thunderstorms, which are also responsible for the unusually heavy rains which periodically cause isolated flooding. Rainstorms which produce 1 to 2 inches of precipitation are common. Relative humidity typically ranges between 50 and 60 percent during the summer. Snow can occur in any and all months from November through April. Annual snowfall averages 17 inches.

The regional average annual temperature is 56° F. (Fahrenheit) with a January mean of 32° F. and a July mean of 79° F.. Periodic polar air fronts move through the area during the winter producing lows of -10 to-15 degrees Fahrenheit. July and August are typically hot and humid, producing temperatures above 90° F. on an average of 22 days/year. Highs in excess of 100° F. generally occur for short periods of 3 to 5 days.

Geology

The geologic formations present in the site study area consist of unconsolidated alluvium and glacial outwash, which are underlain by Mississippian and other bedrock layers. These bedrock layers are underlain by basement granitic crystalline rock. The geologic formation sequence for South-Central Illinois is represented in Figure 4. The study area, the American Bottoms, and the Mississippi River channels are all located in a broad deep cut bedrock valley. The bedrock valley is delineated by bluff lines on both sides. Based upon available data, the bedrock valley has steep walls along the bluff lines while the valley bottom slopes gently toward the middle.

Within the bedrock valley, the Mississippi River has provided the primary mechanisms controlling the recent formation of geology and hydrogeology. Bergstrom, et al (1956) suggests that the bedrock valley is pre-glacial in nature; however, Willman et al (1970) concludes that insufficient data exists to suggest a pre-glacial valley structure for the Mississippi River. Nevertheless, glaciation did significantly modify and redesign the Mississippi River and its valley through both glacial and interglacial periods. These changes occurred as glacial wasting caused massive amounts of meltwater to be directed generally southward through and around bedrock and ice contacts, ultimately discharging into the Gulf of Mexico. Through geologic history, a wide and deep valley (2 to 8 miles across and up to 170 feet deep) has been carved into the predominantly soft sedimentary bedrock underlying the river (Bergstrom, 1956). Changes in stream flow, direction, and sediment load have caused this valley to fill with secondary alluvial sediments. These constantly changing parameters have resulted in the river continuously picking up and depositing (and cutting and filling) its sediment base, thereby directing and redirecting the river and its channels throughout time.

The unconsolidated valley fill, present in the bedrock valley, ranges in thickness from approximately 70 to 120 feet in the study area. The thickness of the valley fill in the region of the study area is depicted in Figure 5. A cross section of the valley fill in the vicinity of the study area is presented in Figure 6.

The valley fill deposits are typically comprised of two main formations which may reach as deep as 120 feet in the site area. The Cahokia, the uppermost formation, is comprised of predominantly silt,

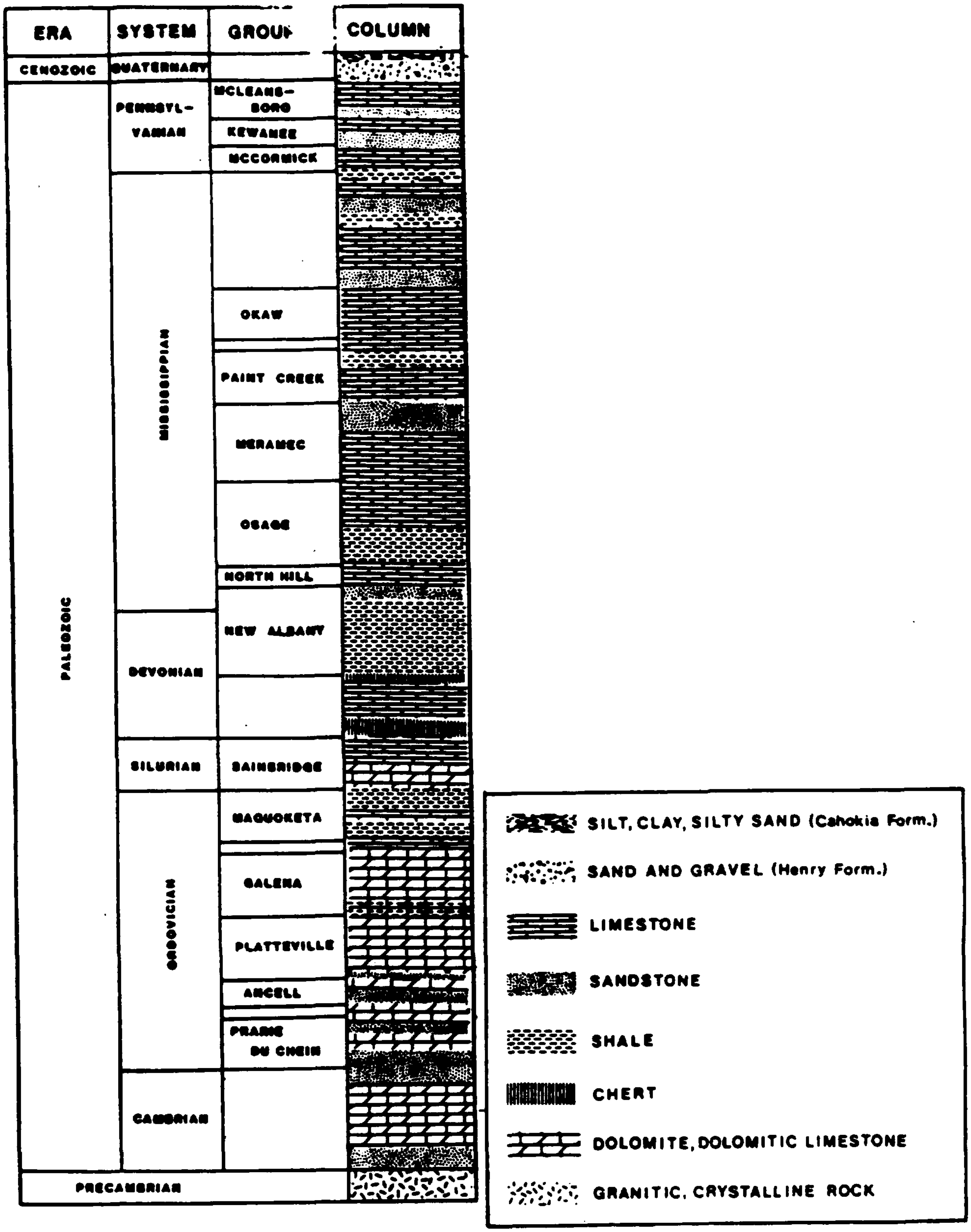


FIGURE 4
GENERALIZED GEOLOGIC COLUMN FOR SOUTH-CENTRAL ILLINOIS

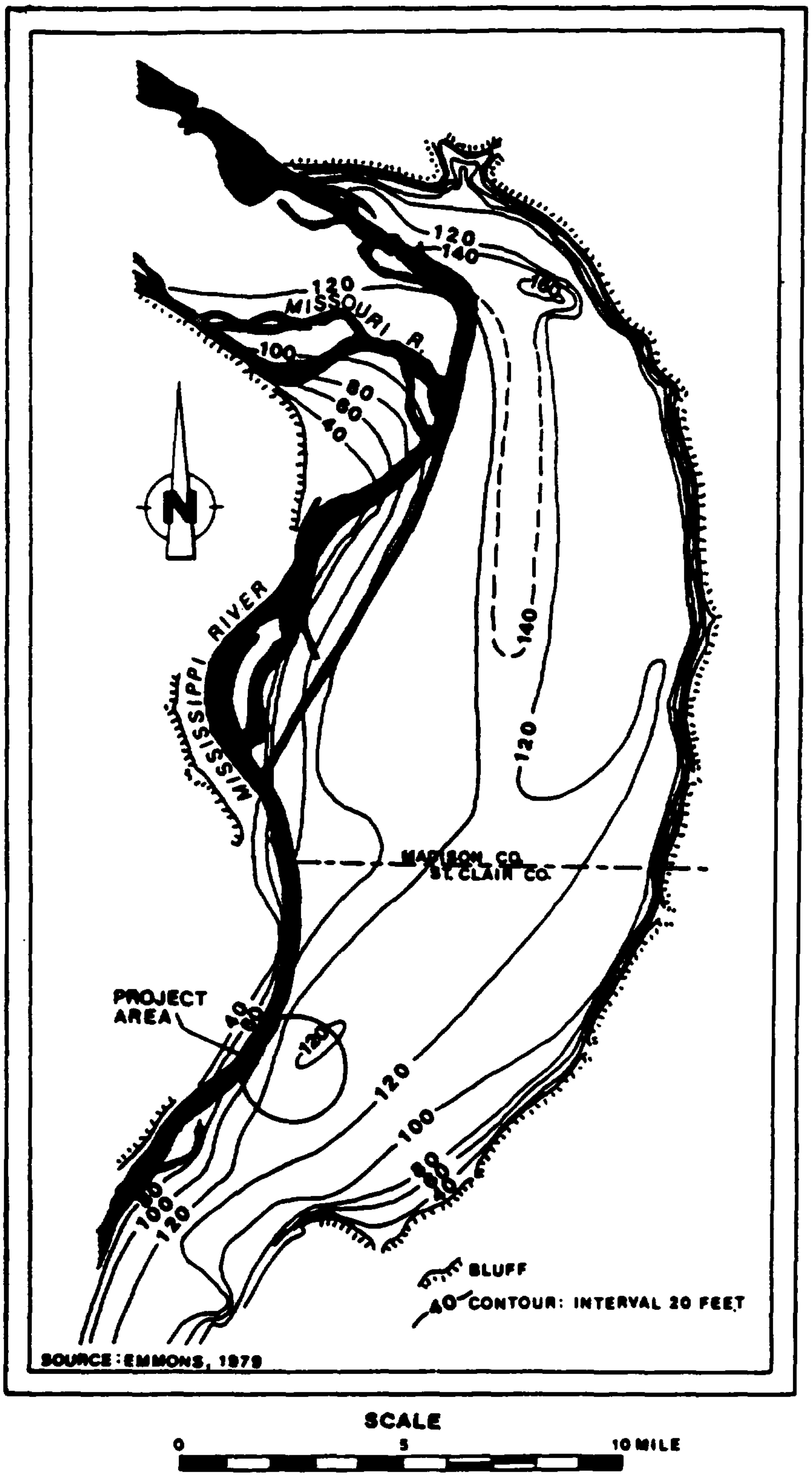


FIGURE 5
THICKNESS OF THE UNCONSOLIDATED VALLEY FILL IN THE DEAD CREEK STUDY AREA

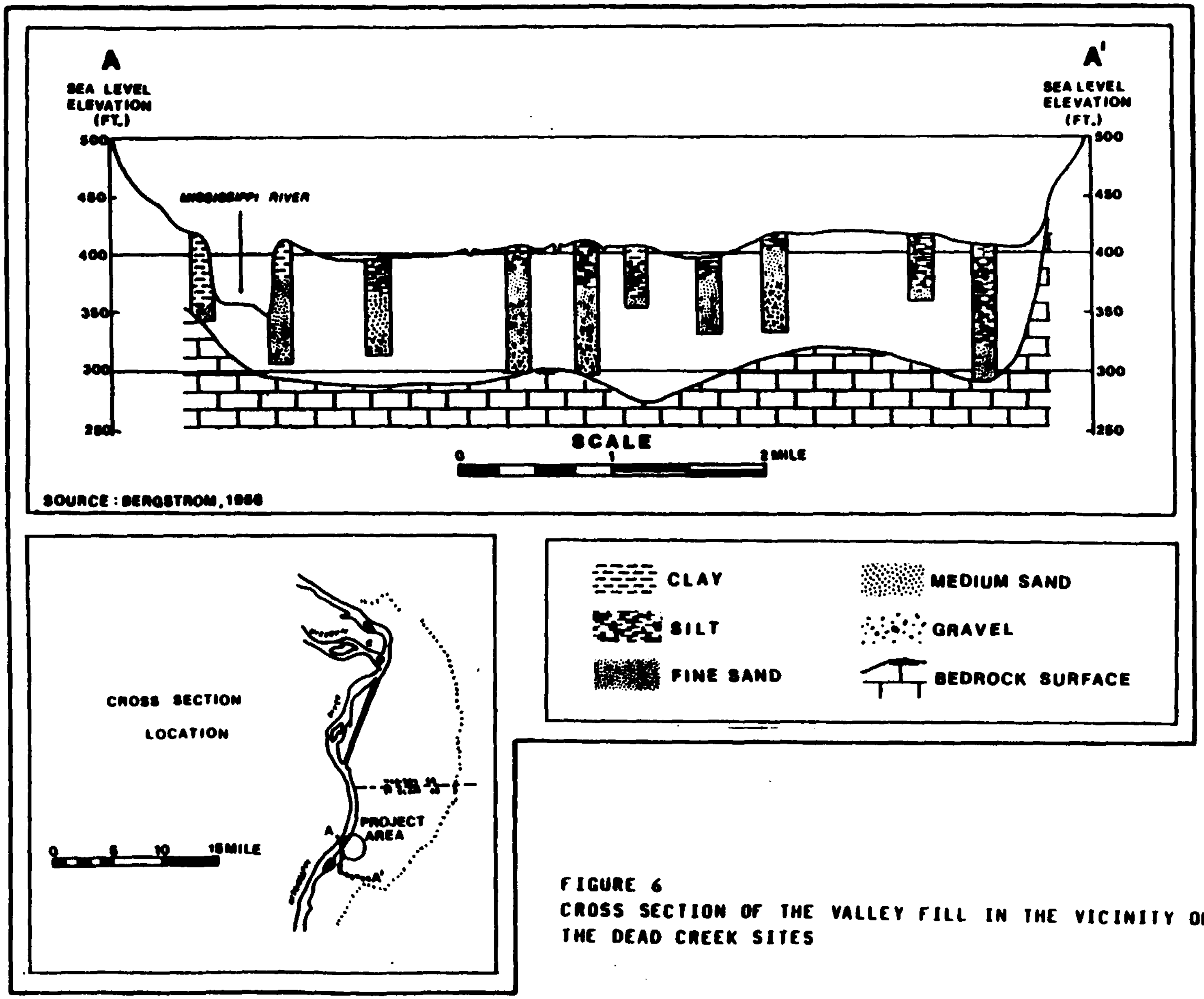


FIGURE 6
CROSS SECTION OF THE VALLEY FILL IN THE VICINITY OF THE DEAD CREEK SITES

clay, and fine sand deposits generally indicative of an aggrading environment. These deposits were laid down as flood events of the Mississippi River, eolian activity, bank slumping, erosion, and/or slugs of material deposited directly by tributary streams. This formation has been frequently reworked by the Mississippi River and typically consists of coarser material intertongued with finer grained deposits. As such, these deposits can be variable in thickness (ranging from 15 to 30 feet). Larger expressions of tributary deposits may form thicker alluvial fans where high energy streams dissipated and dropped their sediment load.

The second major formation of the floodplain setting is the Mackinaw Member of the Henry Formation. This formation underlies the Cahokia Alluvium, and is comprised of sand and gravel from glacial outwash. Within the study area, this material rests directly on the bedrock surface and can be highly variable in thickness (70 to 100 feet) due to the fluvial processes which formed it. This formation typically contains portions which are complexly interbedded due to meandering of the river throughout history.

A third minor formation noted locally within the floodplain, but not discovered within the site investigation area, is the Peyton Colluvium. This material is comprised of fine grained silt (loess) and clay (till) which has slumped from upland areas and accumulated at the base of steep bluffs.

Immediately adjacent to the floodplain (and 3.5 to 5 miles east-south east of the sites) is an upland area marked by a steep (50 to 150 feet above surrounding terrain) bluff. Structurally, these upland areas are based unconformably on bedrock (which has not been eroded as deeply as the adjacent valley), and consists of 10 to 100 feet of uncolsolidated sediments of predominantly glacial origin. No upland formations exist in the study area; however, erosion and slumping of the upland has provided the parent material for the Cahokia Formation and Peyton Colluvium, which are found in the floodplain.

The entire study area is underlain by relatively soft sedimentary rock layers. Typically, these rocks consist of shale, limestone, sandstone, and dolomite, which were formed through geologic time by lithification of sediment and sediment-like materials. In general, parent materials were disintegrated into sand, silt, clay, and mud, which were then deposited sequentially by sedimentary processes, such as precipitation and erosion. These sequential deposits (formations) were ultimately lithified by compression, compaction, reclystallization, and cementation. General depositional environments included shallow and deep seas, rivers, and swamps. These environments provided varying thicknesses of similar materials. Missing sequences apparently represent unconformities caused by terrestrial or near terrestrial erosional processes. These sedimentary rock sequences represent millions of years of geologic time.

The earliest sedimentary rock overlying the granite basement rock is Cambrian age sandstone limestone, dolomite, and shale. The Ordovician system overlies the Cambrian. Its formations consist of sandstone, dolomite, limestone and shale. Overlying the Ordovician is the Silurian System consisting of numerous limestone layers. Next youngest is the Devonian System, with limestone, sandstone, and shale formations. At the top of the sequence is the Mississippian System containing numerous limestone, shale, siltstone, dolomite, and sandstone layers. In the adjacent highlands and at one bedrock high located within the valley south of the site area, the Pennsylvanian System may be found to contain various sandstones, siltstones, and shale formations.

Bedrock structure in the area appears to be controlled by a significant fold (the Waterloo anticline) and fluvial erosion (primarily by the Mississippi River). The fold is centered approximately 6 miles south of the site area, and the structure trends north-northwest. This fold has bent the overlying rock in the area, producing a gentle northeast-east dip of up to 3 percent on the bedrock strata. This allows the deep strata to be exposed by bedrock valley erosional processes to the southwest of the study area, while maintaining these same formations at a deeper elevation to the northeast of the study area.

Hydrology

The description of the hydrology of the study area is divided into the surface drainage and groundwater discussions presented below.

Surface Drainage

The Mississippi River extends far to the north and south of the site area and drains the American Bottoms and the tributary upland area. Although the Mississippi River floodplain is subject to periodic inundation by excess water runoff, most of the area is protected from massive regional flooding by a complex series of levees and other flood control structures. This condition partially adds to local small scale flooding problems since precipitation is trapped behind the flood control structures where drainage is typically poor. Dead Creek itself provides drainage for a portion of the American Bottoms, and ultimately discharges to the Mississippi River via the Prairie DuPont Floodway and Cahokia Chute. Fenneman (1909) has suggested that Dead Creek may at one time have been a southward extension of Cahokia Creek. Excessive siltation, realignment of surface drainage, or stream piracy may have redirected Cahokia Creek to its present channel, thus cutting off Dead Creek from the original source water.

Major surface drainage in the area is also provided by Cahokia Creek (to the north) and the Old Prairie DuPont Creek (to the south). Both of these creeks channel surface water directly into the Mississippi River. Significant additional secondary drainage within the site area and floodplain is provided by an extensive system of storm drains, pumping stations, and ditches, which were constructed or modified from existing natural drainage features for this purpose.

Groundwater

Groundwater exists in both the unconsolidated valley fill and the underlying bedrock formations. The Mississippian bedrock limestone and sandstone are water-bearing formations. Where these formations are located immediately below the unconsolidated material, there is sufficient groundwater for small or medium users. However, because of the abundance of groundwater present in the valley fill sand and gravel, the bedrock aquifer is of little significance to the study area. The majority of available groundwater in the study area is present in, and taken from, the valley fill materials. The Illinois State Water Survey has identified the study area as one in which the chances of obtaining a well yielding 500 gpm or more are good. The coarsest deposits, which are most favorable for water development, are commonly encountered near bedrock and generally average 30 to 40 feet in thickness. However, because of the alluvial nature of deposits in the study area, sand and gravel deposits which yield significant quantities of groundwater are commonly found in the study area nearer the ground surface.

Prior to development of the area, groundwater levels within the study area were very near the surface elevation of 400 ft MSL. As a result, ponds, swamps, and poorly drained areas were prevalent. The development of the area led to the construction of levees, drainage ditches, and wells, all of which caused the lowering of the groundwater levels. In the early 1960's, the extensive industrial pumpage in the study area (over 30 million gallons per day) resulted in a lowering of the water table by as much as 50 feet. However, due in part to the decrease in industrial groundwater use, groundwater levels within the study area have sustained a significant rise since the Mississippi River floods of 1973. Groundwater withdrawal within all of St. Clair County, in 1980, only amounted to 16 million gallons per day. As a result, measurements of monitoring wells near Dead Creek identified the water table at approximately 393 feet MSL (about 15 ft. below ground surface) in January 1981. Groundwater levels near other portions of the study area are expected to be similarly depressed below ground surface except where affected by surface structure or well pumpage. Groundwater levels are affected by flood stages of the Mississippi River, and undergo water-level fluctuations as a result of seasonal weather patterns. In areas remote from major pumping centers, water levels generally recede in late spring, summer and early fall, when discharge from the groundwater reservoir by evapotranspiration, groundwater run-off to streams, and pumping from wells is greater than recharge. Recovery of water levels generally occurs in the early winter when conditions are favorable for infiltration of rainfall to the water table. Water level recovery is especially pronounced during the spring when the groundwater reservoir receives most of its annual recharge. Water levels are generally highest in May and lowest in December. Water levels remote from major pumping centers have a seasonal fluctuation ranging from 1 to 13 feet, with an average fluctuation of about 4 feet.

Based upon the surface drainage system for the region in 1900, R.J. Schicht (Illinois State Water Survey, 1965) estimated the piezometric surface prior to heavy development in the area. Groundwater elevation was estimated to be about 420 feet near the bluffs to about 400 feet near the Mississippi River. The piezometric surface had an average slope of about 3 feet per mile and ranged from 6 feet per mile in the Alton area to the north, to one foot per mile in the Dupo area to the south. The slope of the piezometric surface was greatest near the bluffs and flatest near the Mississippi River. Groundwater movement was generally directed to the west and south toward the Mississippi River and other streams and lakes.

Groundwater movement in the shallow deposits throughout the study area generally follow the land surface topography, with lateral movement toward local discharge zones (wells and small streams), and some movement into the deeper unconsolidated aquifers. Groundwater in the deeper unconsolidated deposits generally follows the bedrock surface. Accordingly, groundwater generally flows downstream through the sand and gravel aquifers in much the same direction as the original streamflow, but at a much slower rate.

In 1962, the general pattern of groundwater flow was slow movement from all directions toward the cones of depression, which had formed due to heavy pumpage, or toward the Mississippi River and other streams. In the study area, the lowering of the water table that accompanied groundwater withdrawal in the area established hydraulic gradients from the Mississippi River towards the pumping centers. In portions of the study area, groundwater levels were below the surface of the river and appreciable quantities of water were diverted from the river into the aquifer by the process of induced infiltration. Within the study area, the slope of the piezometric surface near the cone of depression, produced by pumping at the Monsanto facilities, exceeded 30 feet per mile.

The principal hydraulic properties of the valley fill and alluvium present in the study area indicate that the materials readily transmit groundwater and have a large amount of groundwater storage capacity. In 1952, tests were conducted for the Monsanto Chemical Corporation to evaluate the hydraulic properties of the deposits. The upper 40 feet of unconsolidated materials in the area consisted of sandy clay, and the lower 80 feet of unconsolidated material in the area consisted of various layers of sand and sand and gravel. A pump test was conducted on a well located 515 feet east of the Mississippi River and drilled to a depth of 99 feet. Six observation wells were used to assess the pump test. Using the time-drawdown method of analysis, the coefficient of transmissivity was determined to be 210,000 gpd/ft. The coefficient of storage was determined to be 0.082 (ft^3/ft^3), which is in the range typical of water table conditions. The coefficient of permeability was determined to be 2800 gpd/ft^2.

Recharge of groundwater in the study area is received from direct infiltration of precipitation and run-off, subsurface flow of infiltrated precipitation from the bluff area to the east, and induced infiltration from adjacent river beds, where pumpage has lowered the water table below the level of the river. Direct recharge of the water table only captures a portion of the annual precipitation. A major portion of the precipitation runs-off to streams or is lost by the evapotransporation process before it reaches the aquifer. Nevertheless, precipitation is probably the most important recharge source for the study area as a whole. The amount of surface recharge that reaches the saturation zone depends upon many factors, including the character of the soil and other materials above the water table, the topography, vegetal cover, land use, soil moisture, depth to the water table, the intensity and seasonal distribution of precipitation, and temperature. Because of the low relief and limited runoff in the study area, and because the upper silt and clay fill is not so impermeable as to prevent appreciable recharge, most of the precipitation either evaporates or seeps into the soil. Because of the extensive flood-control network in the area, recharge from floodwaters provides a limited input to the area. Based upon a modified form of the Darcy equation, R.J. Schicht (1965) calculated the average rate of surface recharge to be about 371,000 gpd/sq. mi. for the study area.

Regional groundwater flow components to the west and south provide subsurface recharge to the study area. Schicht similarly estimated that the average recharge from subsurface flow of water from the eastern bluff boundary is 329,000 gpd/mi.

The lowering of the water table as a result of groundwater withdrawals in the study area has, in the past, established a hydraulic gradient from the Mississippi River toward the pumping centers. This resulted in water percolation through the river bed and into the aquifer, producing induced infiltration recharge. Schicht estimated the 1961 induced infiltration recharge volume for the study area to be approximately 18.5 million gpd, or roughly 58%, of the 31.9 million gpd total being withdrawn. Water withdrawal data from 1980 for the study area and areas to the north indicate that total withdrawals amount to only 3.9 million gpd as compared to more than 42 million gpd in 1961. Accordingly, for the study area, the amount of current induced infiltration from the Mississippi is believed to be small due to dramatically reduced groundwater usage. Although current, detailed data for public and industrial water supply wells in the study area is presently unavailable, 1980 Illinois State Water Survey data indicated the presence of ten wells in or generally near the study area.

The chemical character of groundwater found in the study area varies geographically and with depth. Pumping rates and surface activities may also influence local quality. Generally, shallow wells (less than 50 feet deep) are quite highly mineralized and may have a high chloride content. Groundwater in heavily pumped areas often has high sulfate and iron contents and elevated hardness values.

Groundwater quality data developed by Schicht (1965) for Township 2N, Range 10W, Section 26, which includes a major portion of the study area, provides historical chemical data for wells with depths of approximately 100 feet. In general, the water quality was consistent. Hardness values ranged from 377 to 777 ppm, chloride values ranged from 9 to 61 ppm, and sulfate values ranged from 137 to 487 ppm. Recent Illinois State Water Survey data developed by Keefe (1983) identified a general increase in chloride and sulfate concentrations for groundwater in the study area. The general increase in chlorides was associated with the use of road salts since increased concentrations correlated with major highway locations. Increases in sulfate concentrations were speculated to be caused by an upward movement of high sulfate water from the bedrock as a result of pumping activities. Decreases in chloride and sulfate contents of groundwater were identified in a section along the Mississippi River where extensive nearby pumping had resulted in induced infiltration from the river.

III. SITE SPECIFIC DESCRIPTIONS

SITE G. ABANDONED LANDFILL

Site Description

Site G is a former subsurface/surface disposal area which occupies approximately 4.5 acres in Sauget, Illinois. The site is bordered on the north by Queeny Avenue; on the east by Dead Creek; on the south by a cultivated field; and on the west by Wiese Engineering Company property.

The surface of Site G is littered with demolition debris and metal wastes. Several small pits have been observed in the northeast and east-central portions of the site. Oily and tar-like wastes, along with scattered corroded drums, are found in these areas. Additionally, 20-30 deteriorated drums are scattered along a ridge running east-west, near the southern perimeter of the site. The western portion of Site G is marked by a mounded area with several corroded drums protruding at the surface. A large depression is found immediately south of the mounded area. This depression receives surface runoff from a sizable area within the site. Also, exposed debris is present over most of the site. In areas where wastes are not exposed, flyash and cinder material has been used as cover.

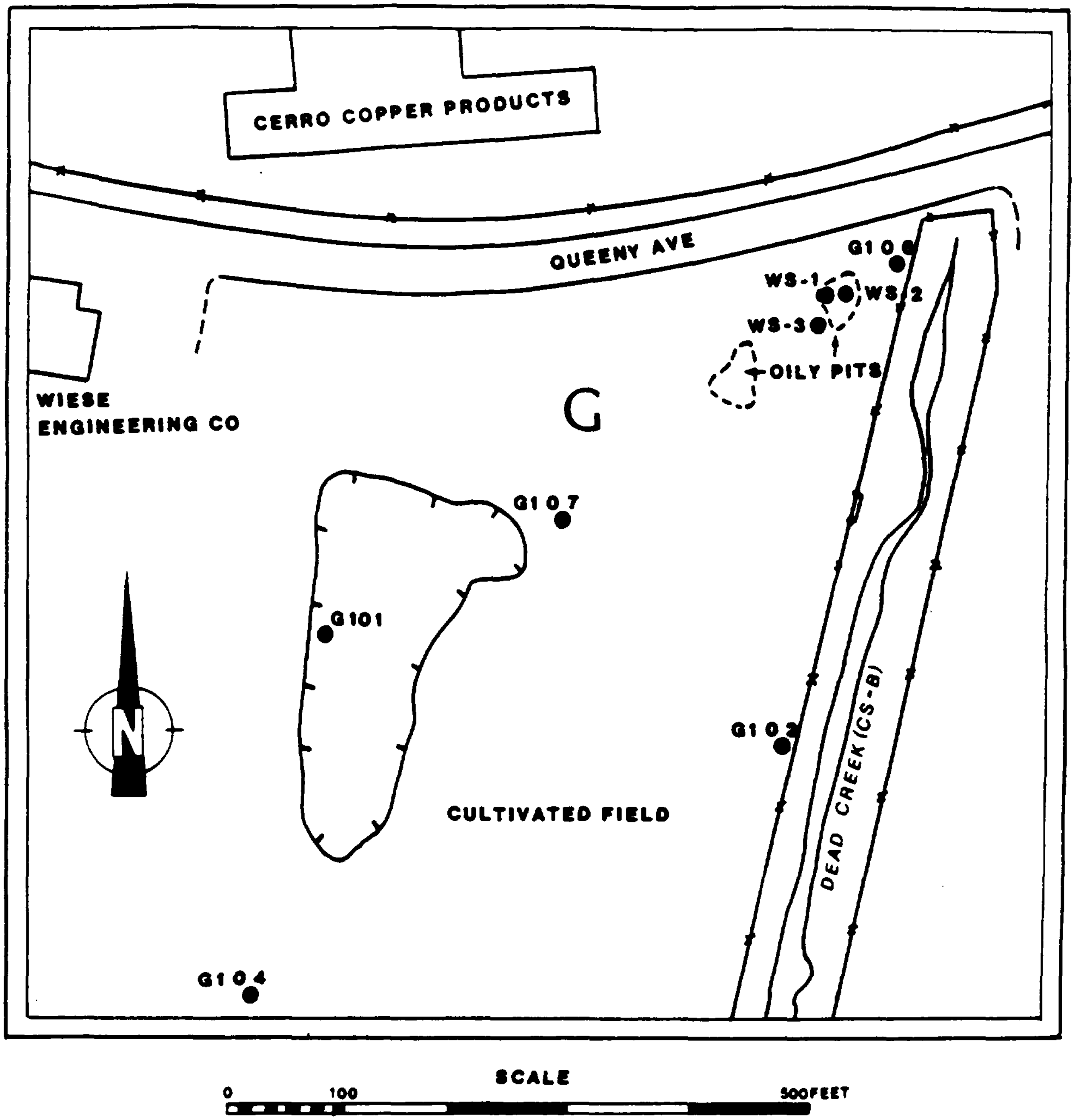
Site History and Previous Investigations

Examination of historical aerial photographs indicates excavation at Site G began sometime prior to 1950 and disposal operations were initiated shortly thereafter. No information is available concerning owners or operators for Site G at the time disposal was occurring. The photographs suggest disposal activities at the site continued until the early 1970s. Presently, Site G is inactive, although recent observations suggest that random dumping of various non-chemical wastes continues.

Site G was previously studied by the Illinois EPA in 1980 and 1981 as part of an area-wide study to determine the source of contamination found in Dead Creek.

The results of this study were reported in the Preliminary Hydrogeological Investigation in the Northern Portion of Dead Creek and Vicinity in 1980-1981 (St. John Report). Locations of samples collected to date in the vicinity of Site G are shown on Figure G-1. The IEPA study completed in 1981 included collecting samples from subsurface soils and groundwater at Site G, and collecting surface water and sediment samples from Dead Creek immediately east of the site. Monitoring well G106 was installed in the northeast corner of the site, and well G107 is located approximately 50 feet south of Site G in a surface depression. In addition, wells G101 and G104 were installed southwest of the site as part of the general area investigation. Analytical data for these wells are presented in Tables B-6, B-7, and B-8, located in the Creek Sector B portion of this report. Several organic contaminants were detected at elevated levels in well G107. These include chlorophenol, chlorobenzene, dichlorophenol, dichlorobenzene, and PCBs. PCBs were also detected in samples collected from well G106. Both of these wells showed concentrations of heavy metals; specifically arsenic, barium, copper, lead, and manganese, which exceeded IEPA water quality standards. Phosphorus also exceeded the standards in both wells. Wells G101 and G104 showed little evidence of contamination although trace levels of PCBs were found in G101. Preliminary surveillance in November, 1985 at Site G showed wells G101, G104, and G107 to be intact. Well G106 was not located, and is suspected to have been destroyed.

In order to determine the vertical distribution of contaminants in the area, the IEPA collected subsurface soil samples at the locations of wells G106 and G107. Analytical data from these samples is shown in Table G-1. High levels of metals and phosphorus were detected in all samples. Trace levels of PCBs were found to a depth of 13 feet at G106. A quantified level (0.62 ppm) of PCBs was found at a depth of two feet in the location of G107, but PCBs were not detected in deeper samples. In October, 1984, IEPA collected three soil samples



LEGEND

G106	IEPA MONITORING WELL
WS-1	IEPA WASTE SAMPLING LOCATION

FIGURE G-1
DEAD CREEK SITE AREA G WITH SAMPLE LOCATIONS

TABLE G-1: ANALYSIS OF SUBSURFACE SOIL SAMPLES
FROM SITE G (COLLECTED BY IEPA IN 1980)

SAMPLE LOCATION AND DEPTH

PARAMETER	G106							G107						
	7.5'-9.0'	10'-11.5'	12'5'-13'	15.5'-17'	18'-19.5'	20'-21.5'	30'-31.5'	0.5'-2'	5'-6.5'	10.5'-12'	15.5'-17'	18'-19.5'	20.5'-22'	25.5'-27'
Copper	140	90	59	54	56	28	14	91	53					
Iron	12,600	12,300	10,400	9,700	13,600	5,700	4,700	21,200	21,900					
Lead	15	11	8	9	12	3	6	170	49					
Nickel	36	21	11	43	21	8	19	37	39					
Phosphorus	592	475	383	391	540	249	183	1340	681					
Zinc	183	53	36	43	49	29	-	370	313					
PCBs	*	*	*	-	-	-	-	0.62	-					

NOTE: All results in ppm
Blanks indicate parameter not analyzed
- below detection limits
* detected but not quantified (trace)

at Site G from a pit in the northeast corner. Analyses of these samples are presented in Table G-2. Elevated levels of heavy metals were found in all samples, as were various organic contaminants. PCBs were detected in sample WS-3, but not in the other two samples. Sample WS-1 showed the highest degree of organic contamination. Organics detected in this sample include dimethyl phenanthrene, phenyl indene, pyrene, trimethyl phenanthrene, and aliphatic hydrocarbons.

Data from additional samples taken adjacent to Site G in Dead Creek are addressed in the narrative for Creek Sector B. Site G may be a source of contamination in Dead Creek; however, since the hydrology in the area is not well-defined, this cannot presently be determined.

A geophysical investigation, including flux-gate magnetometry and electromagnetics (EM), was completed at Site G in December, 1985 as part of the Dead Creek RI/FS project. A survey grid with dimensions of 440 by 600 feet was laid out using a compass and tape measure. Because of the large amount of scrap metal scattered about the surface of Site G, instruments were calibrated in off-site areas. The magnetometer survey was subcontracted to Technos, Inc. of Miami, Florida.

The magnetometer survey at Site G showed that a major magnetic anomaly covers most of the northern portion of the site. Several smaller anomalies were found to the north of the large depression in the southwest corner of Site G. Survey lines run south of the fill area in a cultivated field showed no magnetic anomalies above background conditions. The mounds in the northwest corner of the site showed smaller anomalies at the surface and larger anomalies for deeper readings, indicating significant quantities of buried metals.

An EM survey was done using the same grid as for the magnetometer investigation. Shallow soundings indicated three areas showing relatively high intensity anomalies. These include a 50 feet by 20

TABLE G-2: ANALYSIS OF WASTE SAMPLES FROM OILY PIT AT SITE G
(COLLECTED BY IEPA 10-1-84)

PARAMETER ANALYZED	SAMPLE NUMBER WS-1	WS-2	WS-3
Arsenic	0.3	0.6	97
Cadmium	0.1	0.8	16.8
Copper	101.4	509	712
Chromium	24.4	27.2	30
Iron	106	151	6025
Lead	26.6	52.1	337
Manganese	-	-	9.9
Mercury	0.36	0.46	1.99
Zinc	101.4	339	104,100
Aliphatic Hydrocarbons	19,200	5.23	-
Chlorobenzene	-	0.58	-
Dimethyl phenanthrene	3100	-	-
Phenyl indene	320	-	-
Pyrene	610	-	-
Trimethyl Phenanthrene	1400	-	-
PCBs	-	-	18
Other Organics (not specified)	1200	0.4	4070

NOTE: All results in ppm
- indicates below detection limits

feet area in the northeast corner, a 150 feet by 100 feet area in the east-central portion, and the entire mounded area along the west perimeter of the site. Deep soundings (approximately 10 to 15 meters in depth) indicated a significant anomaly covers most of the northern portion of the site. Three negative anomalies were recorded in the center of the fill area, possibly indicating higher, off-scale instrument readings or the presence of significant quantities non-conductive material such as concrete. The EM survey also showed anomalies trending off-site in the northwest corner, indicating the possibility that the actual filled area extends north under Queeny Avenue.

Data Assessment and Recommendations

Activities proposed at Site G for the Dead Creek Project include collecting 10 subsurface and 40 surface soil samples, and water samples from IEPA wells located on or near the site. A soil gas monitoring survey is also scheduled for Site G, and will be conducted in conjunction with ambient air monitoring at the site. Additional investigation is necessary to adequately characterize the site and to provide an adequate data base for conducting the feasibility study. Existing monitoring wells in the vicinity of the site need to be refurbished prior to sampling. Additional wells need to be installed around the site to determine if Site G is contributing to groundwater pollution in the area. Additional borings and subsurface sampling (alternatively excavation of test pits and sampling) in anomalous areas encountered during the geophysical study would be needed to provide additional information concerning depth of fill, waste characteristics, and past operation. This additional information will allow more specific evaluation of remedial alternatives. The hydrology of Site G in relation to Dead Creek also needs to be assessed to determine if the site is a source of pollution observed in the creek. This assessment would include collecting the following data: (1) Ground water elevations from a minimum of three locations on each side of the creek, (2) Surface water and creek bed elevations from three locations in the creek, and (3) Infiltration rates for the alluvium and the Henry formation at Site G. The above data, in conjunction with the stratigraphic columns from borings in the creek bed (St. John Report), would provide sufficient information to determine the relationship, if any, between ground water and the surface hydrology of the creek.

It was previously noted that IEPA well G106 was not located during a preliminary survey. Further attempts should be made to locate this well and to repair it if it is feasible to do so. The condition of all IEPA wells should be assessed, and reconstruction or redevelopment should be performed in accordance with the assessment.

SITE H. ROGER'S CARTAGE PROPERTY

Site Description

Site H is a former disposal area covering approximately five acres in Sauget, Illinois. The site is located immediately southwest of the intersection of Queeny Avenue and Falling Springs Road. Presently, Site H is an open field which has been covered, vegetated, and graded. Several depression areas, capable of retaining rain water, are also evident. Surface drainage is generally to the west; although certain localized drainage is toward the aforementioned depressions.

Site History and Previous Investigations

A review of historical aerial photographs indicates that Site H was initially used as a disposal area sometime around 1940. Monsanto Company submitted a "Notification of Hazardous Waste Site Form" to the U.S. EPA in 1981, indicating below-ground drum disposal of organics, inorganics, and solvents. The notification listed the site name as Sauget Monsanto Illinois Landfill, and indicated that waste disposal continued until 1957. Site H is presently owned by James Tolbird of Roger's Cartage Company. Photographs suggest the site initially operated as a sand and gravel borrow pit prior to disposal activities. The southern half of Site I operated contiguously with Site H, and the properties were subsequently separated by the construction of Queeny Avenue.

Previous investigation of Site H is limited to review of historical photographs and the installation of one monitoring well downgradient from the site. This well, G110, was sampled in 1980 and 1981 as part of IEPAs hydrogeological investigation. Analytical data for well G110 is shown in Tables B-6, B-7, and B-8, presented in the Creek Sector B portion of this report. Contaminants detected in G110 include PCBs, chlorophenol, cyclohexanone, arsenic, copper, and nickel.

As part of the Dead Creek Project, a geophysical survey, including flux-gate magnetometry and EM, was conducted at Site H in December 1985. A survey grid with dimensions of 520 feet by 550 feet was laid out over the site using a compass and tape measure. Technos, Inc. was contracted to conduct the magnetometer survey.

The results of the magnetometer survey indicate three large areas with major magnetic anomalies and two smaller localized areas with lower intensity anomalies (Figure H-1). All anomalies are of sufficient magnitude to indicate buried drums or a large amount of other buried ferrous metal. The southernmost, large anomalous area correlated well with one of the surface depressions observed recently at the site, while the other two large areas partially correlated with depressions. This information, in conjunction with historical photographs, indicates that all anomalous areas are part of one large fill or disposal pit.

Further evaluation of Site H was done using EM with various coil spacings, allowing for different depths of penetration. Results from shallow soundings (0 to 7.5 meter effective depth range) indicate three high intensity anomalies which correlate well with the magnetic anomalies seen in the magnetometer survey. These anomalous areas were also seen in the results from intermediate soundings (5 to 15 meters). In addition, three negative anomalies were noted near the north and central portions of the site. These negative readings indicate areas of lower conductivity, and may be attributable to relatively non-conductive contaminants (organics), or to other materials such as concrete rubble or clay. Deep soundings (12 to 30 meters) showed much lower conductivity readings over the entire site, which may indicate that disposal was generally limited to a depth of less than 15 meters.

Data Assessment and Recommendations

The absence of any detailed historical information concerning waste disposal or analytical data concerning Site H creates a major data

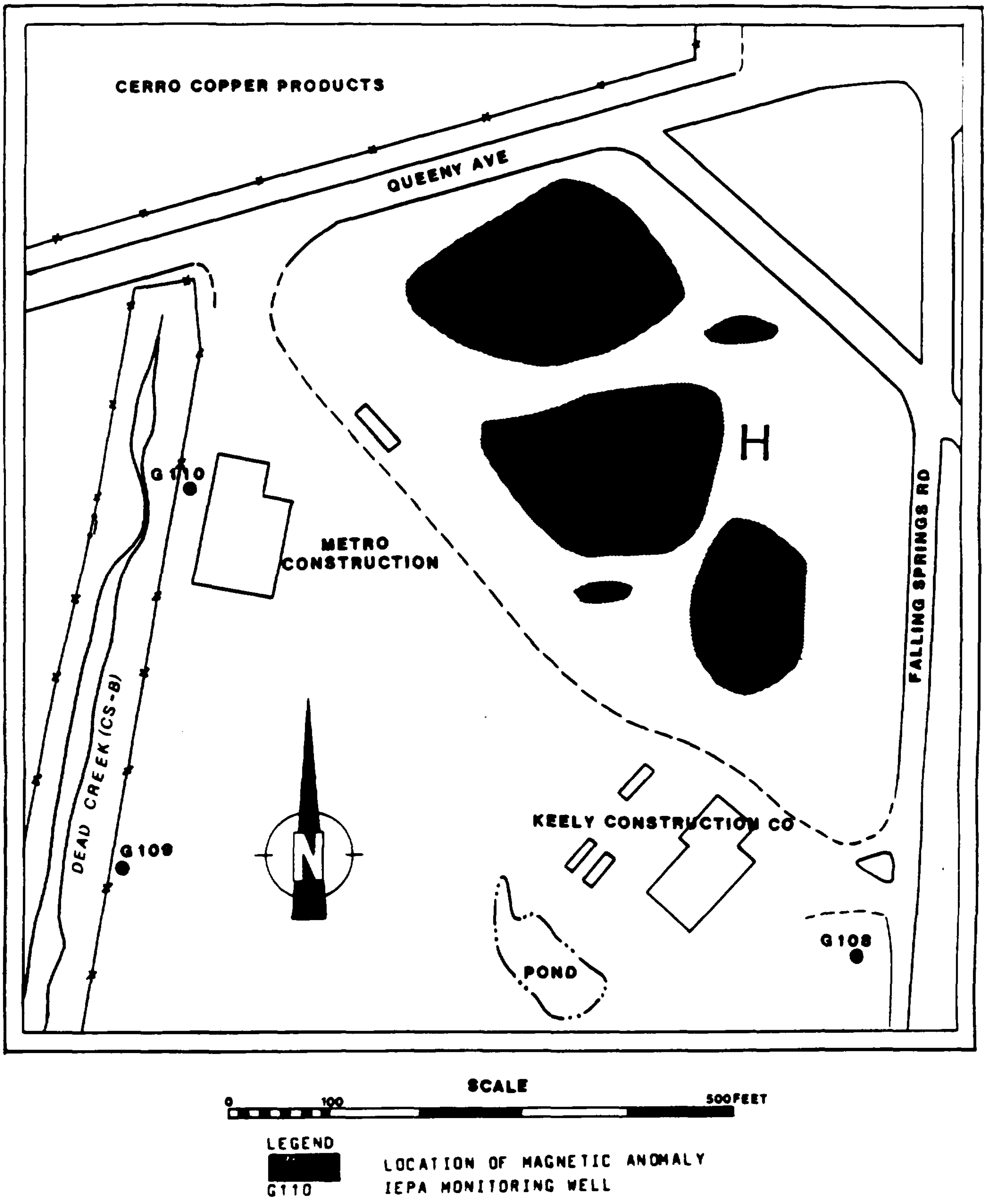


FIGURE H-1
DEAD CREEK SITE AREA H WITH MAGNETIC ANOMALIES

gap. The scope of work for this site during the Dead Creek Project includes collecting five surface and five subsurface soil samples for analysis. A soil gas survey and ambient air monitoring will also be completed at Site H. If specific contaminants are found, this data base would not be sufficient to conduct feasibility study evaluations.

Depending on the results of the initial sampling, additional sampling will be required to further define the extent of any contamination found at the site. This would include installation of monitoring wells and evaluation of ground water conditions. Further geophysical investigations to the north to Cerro Copper Products Company property would allow for more accurate definition of site boundaries and potential drum disposal areas. Additional borings and subsurface sampling or pit excavation would be necessary to accurately determine locations and types of buried wastes.

SITE I AND CREEK SECTOR A - CERRO COPPER PRODUCTS

Site Description

Site I is an operating copper refining and tube manufacturing facility covering approximately 55 acres in Sauget, Illinois. The areas of interest for the Dead Creek Project at this facility include a former sand and gravel pit which was subsequently filled with unknown wastes, and a holding pond (Creek Sector A) which formerly served as head waters for Dead Creek. The Cerro Copper Products property is bordered on the north by the Alton and Southern Railroad; on the west by Illinois Route 3; on the south by Queeny Avenue; and on the east by Falling Springs Road. The areas to be investigated encompass roughly the eastern one-third of the property. Presently, the former gravel pit/fill area is covered and graded, and is used for equipment storage.

Site History and Previous Investigations

Cerro DePasco Corporation of New York purchased the existing plant and property west of Dead Creek in 1957 from the Lewin-Mathes Corporation. Cerro Copper subsequently added property east of the creek to their holdings in 1967. Examination of historical aerial photographs indicate subsurface disposal at Site I was discontinued sometime between the years 1955-1962. These photographs also show that Site I and Site H, which is located across Queeny Avenue to the south, constitute one large subsurface disposal area. Monsanto company submitted a "Notification of Hazardous Waste Site" form for this landfill (Sauget Monsanto Illinois Landfill), indicating disposal of organics, inorganics, and solvents in drums. The years of operation listed on the notification are "unknown to 1957." Historical photographs suggest activity at the site began prior to 1937.

Creek Sector A reportedly received discharges from Monsanto and other companies prior to 1970. In the early 1970's, the culvert under Queeny Avenue was sealed off to restrict flow from these ponds to the remainder of Dead Creek. The ponds were subsequently regraded to the north for the purpose of directing drainage into a concrete vault with a bar screen located at the north end of the Cerro Copper Products property. When the water level in the ponds rises, the water discharges through the vault to an interceptor, which ultimately drains to the Sauget Wastewater Treatment Plant. According to Cerro Copper officials, the only direct discharges to the holding ponds at this time are area run-off and roof drainage. No process wastewater, cooling water, or other wastes are directly discharged. Five runoff drain pipes project from the west bank of the ponds.

The holding ponds, Creek Sector A, on the Cerro Copper Products property were identified as a major source of groundwater pollution in the area as a result of the IEPA Preliminary Hydrogeologic Investigation completed in 1981. Analyses of water and sediment samples from the holding ponds are included in Tables IA-1 and IA-2, and sample locations are shown in Figure IA-1. Contaminants detected at significant concentrations in these samples include PCBs, dichlorobenzene, aliphatic hydrocarbons, arsenic, cadmium, chromium, lead, and mercury.

The IEPA Preliminary Hydrogeologic Investigation also included installation of one monitoring well on the Cerro Copper Products property downgradient from Site I and the holding ponds. Analyses of samples collected from this well (well number G112) are included in Tables B-6, B-7, and B-8, located in the Creek Sector B portion of this report. Contaminants detected at elevated levels in this well include chlorobenzene, dichlorobenzene, chloroaniline, phenol, copper, phosphorus, and zinc. The contaminants in the ground water may be attributable to Site I or the holding ponds (Creek Sector A); however, a more detailed investigation is necessary to accurately determine the source.

A geophysical investigation was scheduled to be conducted at Site I as part of the initial investigations for the Dead Creek Project.

TABLE IA-1: ANALYSIS OF WATER SAMPLES FROM CREEK SECTOR A
(COLLECTED BY IEPA)

PARAMETERS	SAMPLE DATE AND LOCATION 11/26/80 5503	11/26/80 5504	1/26/81 5501	1/26/81 5502
Alkalinity	127	110		
Ammonia	0.2	1.0		
Arsenic	0.058	0.025		
Barium	1.2	0.7		
BOD-5	630	158		
Boron	0.2	0.3		
Cadmium	0.36	0.19		
COD		1190		
Chloride	33	36		
Chromium (Total)	0.61	0.21		
Copper	4.5	3.6		
Cyanide	.01	.01		
Fluoride	0.4	0.7		
Hardness	227	260		
Iron	58	28		
Lead	6.6	2.8		
Magnesium	35.8	28.7		
Manganese	1.0	0.67		
Mercury	0.0016	0.0016		
Nickel	4.2	3.3		
Nitrate-Nitrite	1.4	1.7		
pH	6.9	7.0		
Phenols	0.02	0.035		
Phosphorus	1.9	3.4		
Potassium	4.3	6.2		
R.O.E.	361	407		
Selenium	0.002			
Silver	0.24	0.14		
Sodium	19.7	22.4		
Sulfate	90	130		
Zinc	30	17		
PCB (ppb)	22	28	2.0	-
Aliphatic hydrocarbons (ppb)	23,000			

NOTES: All results in ppm unless otherwise noted
Blanks indicate that parameter was not analyzed
\- Indicates below detection limits

TABLE IA-2: ANALYSIS OF SEDIMENT SAMPLES FROM CREEK SECTOR A
(COLLECTED BY IEPA)

PARAMETERS	11-26-80 x128	11-26-80 x129	1-28-81 x128	1-28-81 x129
Ammonia			30	96
Barium			1200	2500
Cadmium			51	22
Calcium			5300	13,100
Chromium			140	490
Copper			5500	24,000
Iron			29,500	51,900
Lead			840	2600
Magnesium			2300	2100
Manganese			140	250
Mercury			101	6.9
Nickel			570	1500
Potassium			670	520
Silver			29	98
Zinc			2300	5800
Aliphatic Hydrocarbons	13	26		
Dichlorobenzene	-	1.7		
PCBs	2.2	13		

NOTES: All results in ppm
Blanks indicate parameter not analyzed for
- below detection limits

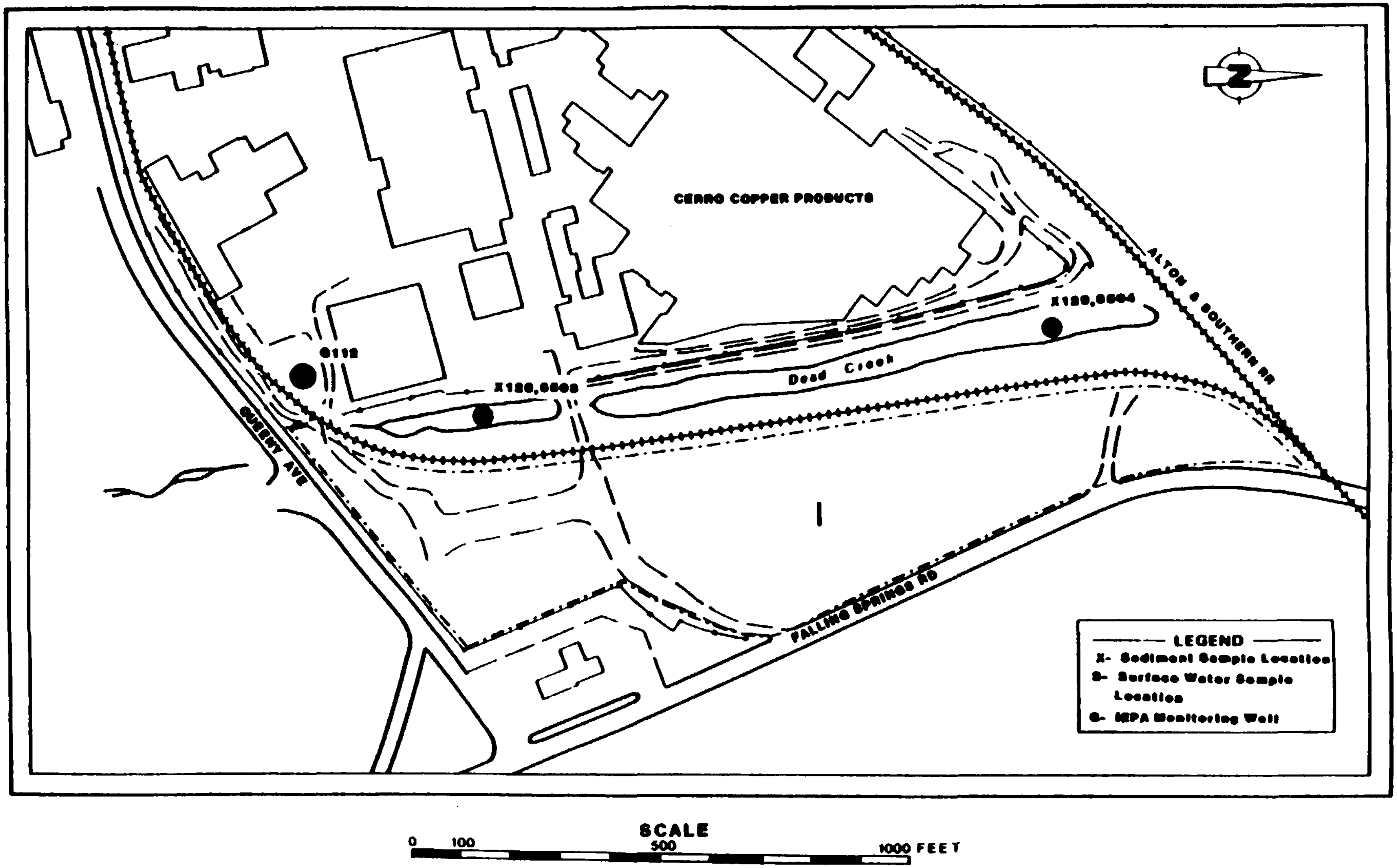


FIGURE IA-1
DEAD CREEK SITE AREA I AND CREEK SECTOR A WITH SAMPLING LOCATIONS

This investigation was cancelled on the scheduled day due to the denial of access to the site by Cerro Copper officials.

Data Assessment and Recommendations

Field activities to be completed for these sites during the project include collecting 32 surface soil and 15 subsurface soil samples at Site I, and collecting three surface water samples from Creek Sector A. A soil gas survey and ambient air monitoring are also scheduled to be conducted at Site I. In order to have an adequate data base to complete the feasibliity study for these sites, additional information is necessary. Additional field activities should include a more detailed characterization of Creek Sector A, which would be accomplished with sediment sampling and assessment of subsurface soil and ground water conditions.

For Site I, the proposed geophysical investigation should be completed prior to any additional field activities. Subsequent to the geophysical investigation, 5-6 monitoring wells should be stratigically located to ensure efficient collection of data necessary to identify the presence of and to determine the sources of any ground water contamination. Additional subsurface soil sampling would be conducted, as necessary, in conjunction with monitoring well installation. Excavation of test pits, in conjunction with sampling, is an alternative method of data collection for Site I.

SITE J. STERLING STEEL FOUNDRY

Site Description

Site J consists of two pits and a surface disposal area utilized by an active steel foundry in the Village of Sauget, Illinois. The site is bordered on the north by the Alton and Southern Railroad; on the west by Monsanto Road; on the south by Little Avenue, and on the east by a Mobil Oil Tank Farm. The surface disposal area is defined by a triangular portion of the property to the northeast of the plant buildings. Generally, surface drainage in this area is directed toward a ditch along the northern perimeter. However, several scattered depression areas are also evident. Two unlined pits and one concrete-lined surface impoundment were observed at Site J, along with an incinerator which is no longer in use (Figure J-1).

Site History and Previous Investigations

The pit located southeast of the plant building was excavated approximately 30 years ago, based on a review of historical aerial photographs. According to the site operator, it was a borrow pit for road construction fill. The pit was subsequently filled with scrap metal, demolition debris, and casting sand. No evidence has been found suggesting disposal of hazardous materials in the borrow pit. The other unlined pit, located north of the plant building, was excavated in approximately 1950 for the purpose of collecting and settling baghouse dust from furnaces in the foundry. The dust is blown into this pit through underground piping, thus reducing the chance for off-site migration of airborne particulates. The adjacent concrete impoundment has two aerators, used to cool water from the furnaces and compressors.

A small incinerator is situated immediately west of the former borrow pit at Site J (Figure J-1). It has a stack approximately 15-18 feet in height, and was used solely to burn trash and empty bentonite sacks, according to the plant operator. The incinerator was operated

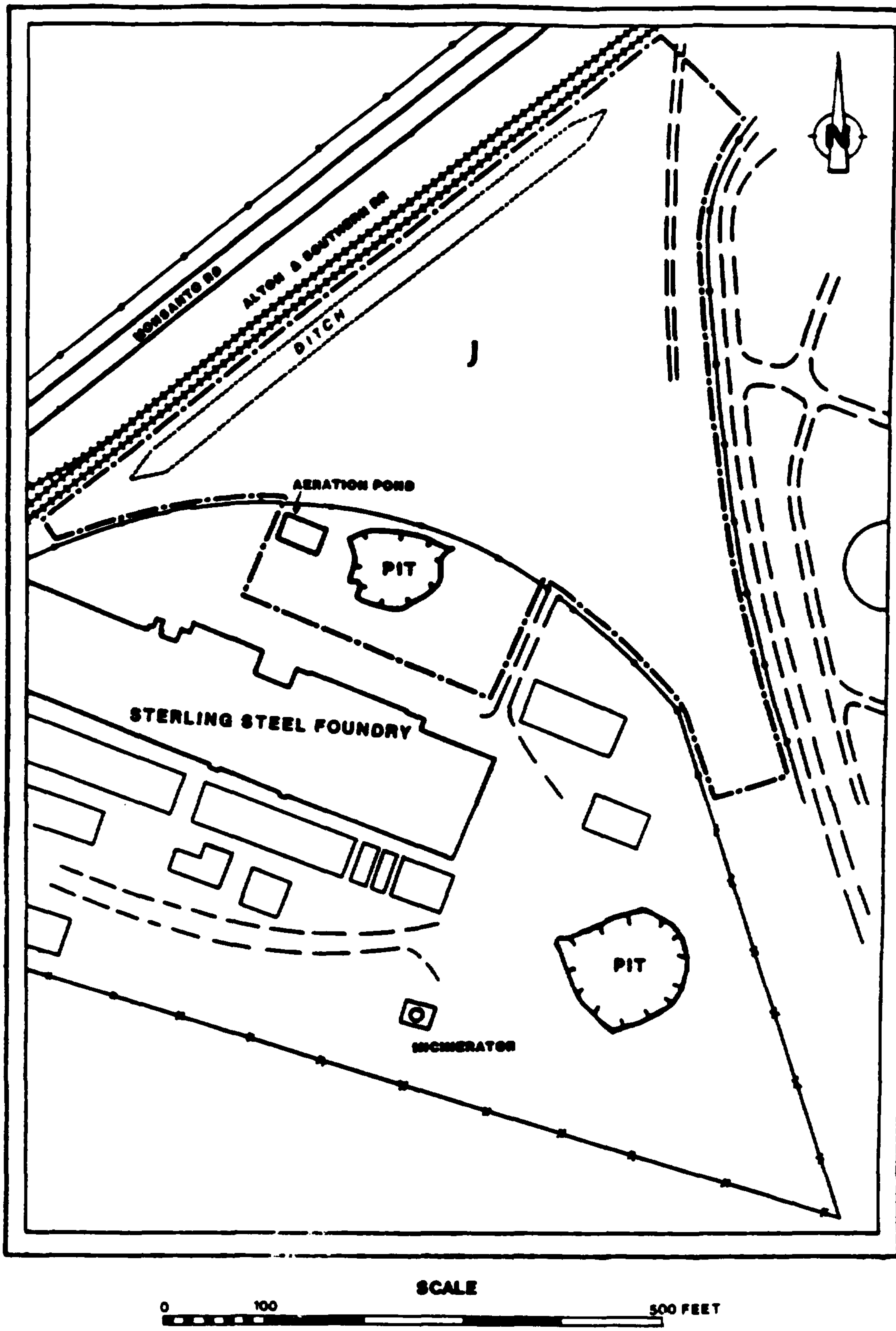


FIGURE J-1
DEAD CREEK SITE AREA J

for 10-12 years following its installation in 1970.

The surface disposal area covers approximately six acres to the northeast of the plant buildings. Sometime in the mid-1970's, Sterling Steel began to use this area for disposal of spent casting sand, slag, scrap steel, and construction debris. No initial excavation was done in this area prior to disposal activities, other than installing a drainage ditch along the northern perimeter. The area is periodically graded, although several depressional areas are evident. Several corroded drums, apparently containing only casting sand and slag, were also observed during a recent visit to the site.

R. O. Shive and Claude Harrell began operations at Sterling Steel Castings Company at its present location in 1922. In 1982, St. Louis Steel Company purchased the facility, and the name was changed to Sterling Steel Foundry, Inc. Raw materials used in Sterling's casting operations included manganese, chromium, nickel, the molybdenum, silicon, bentonite, and water. Water is circulated from furnaces and compressors to the aerated holding pond, and wastewater is directed to the Sauget Treatment Plant.

Site J has not been previously investigated by IEPA. The site was identified by inspection of historical photographs, which indicate possible disposal in the sand pits.

The original scope of work for the Dead Creek Project, as stipulated in the RFP, called for geophysical investigations at Site J to determine potential areas of drum disposal. Based on background review and visual observation, it was determined that geophysical surveys could not adequately define such locations in the originally proposed surface disposal area. This is due to the high metal content of the wastes in the area (casting sand, slag, scrap steel, steel shot), which would result in the entire site appearing as one large anomaly, thereby making it impossible to differentiate drums from other wastes.

A scaled down geophysical survey, including flux-gate magnetometry and EM, was conducted in an area adjacent to the unlined pit northeast of the plant buildings (Figure J-1). The purpose of this survey was to determine if drum disposal may have occurred in this area. A 100 feet by 100 feet grid was set up in a grassy area immediately east of the pit, and survey lines were run on 20 foot intervals. The magnetometer survey results indicated no sigifnicant anomalies within the survey area. Several small anomalies did appear, but were not large enough to infer drums. On-site observations suggest that these smaller anomalies are a result of buried slag or interference from steel castings and scrap metals which are stored adjacent to the survey area.

An EM survey was conducted using the same basic grid system as above. However, several survey points were offset due to physical limitations (coil spacings for the EM are changed depending on desired penetration, thus necessitating offsets). Analysis of the EM data for both horizontal and vertical dipoles (10 meter spacing) indicates an elongate, elliptical-shaped anomaly southeast of the unlined pit. This anomaly dissipates to the north, and is likely attributable to the stockpiled castings and scrap.

Data Assessment and Recommendations

No analytical data is presently available concerning Site J. The scope of work for this project includes collecting five surface and five subsurface soil samples for waste characterization. In addition to this sampling, a soil gas survey and ambient air monitoring will be conducted at Site J. If contamination is detected, additional attempts should be made to locate information concerning past operations at the site. Additional subsurface soil sampling and installation and sampling of ground water monitoring wells should then be carried out. If contamination is detected, this added investigation would be essential in order to complete feasibility study activities.

SITE K. FORMER SAND PIT

Site Description

Site K is the location of a former sand pit for which no file information could be located. The site is located north of a residential area on Queeny Avenue, and east of Falling Springs Road in Sauget, Illinois (Figure K-1). Site K covers approximately six acres, and presently the property is unoccupied. Several trucks with the name M-T-S, Inc. (Sauget) on the doors were observed at the site during preliminary reconnaissance, but there was no activity at the property. Subsequent attempts to contact M-T-S, Inc. by telephone did not succeed. Several trailer homes and houses are located within 100 feet of the site. The pit, which constitutes Site K, has been filled and covered with soil and gravel, and the area has been graded to the surrounding topography.

Site History and Previous Investigation

Historical aerial photographs suggest possible waste disposal operations at Site K. Excavation at the site began sometime in the late 1940s. By 1955, the site was filled with unknown materials, and a vegetation cover had started to develop. No buildings were apparent at the site at the time of the initial excavation. After the excavation was filled, the site remained unchanged until at least 1968. Photographs from 1973 again show an excavation, somewhat larger than the first one, in the same location at Site K. This pit contained water, as seen in photographs from 1973 and 1974, and a building had been erected at the site sometime prior to 1973. No information has been located concerning operations at the site during this time period. The second excavation was filled with unknown materials by 1979, and the site has apparently remained generally unchanged since that time.

Previous investigation of Site K has been limited to a review of the historical photographs. No field investigations have been conducted at the site.

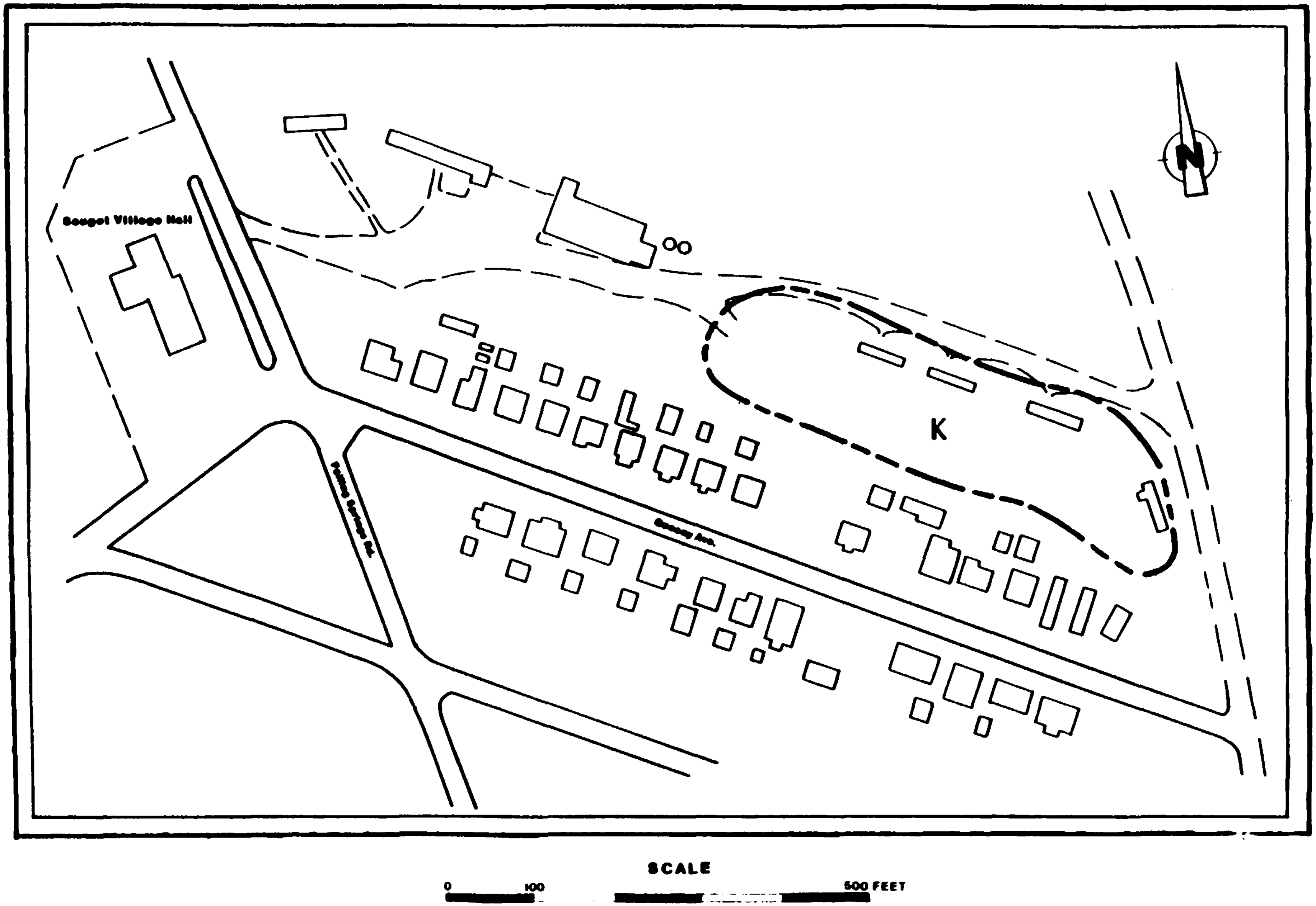


FIGURE K-1
DEAD CREEK SITE AREA K

Data Assessment and Recommendations

No sampling and/or analytical data has been developed to date for Site K. Since other sand pits/disposal operations in the area have shown significant contamination, it is entirely possible that the disposal of hazardous materials did occur at this site. Field activities scheduled for Site K consists of collecting three subsurface soil samples and conducting soil gas and ambient air surveys. This sampling should be adequate to determine the presence of wastes and also indicate if further investigation is necessary. If contamination is detected, additional attempts should be made to locate information concerning past operations at the site. Additional subsurface soil sampling and installation and sampling of groundwater monitoring wells should then be carried out. If contamination is detected, this added investigation would be essential in order to complete feasibility study activities. In addition, depending upon subsurface conditions identified, a geophysical investigation may be of value to delineate pit boundaries as well as determine the presence of subsurface drum disposal.

SITE L - OLD WAGGONER COMPANY IMPOUNDMENT

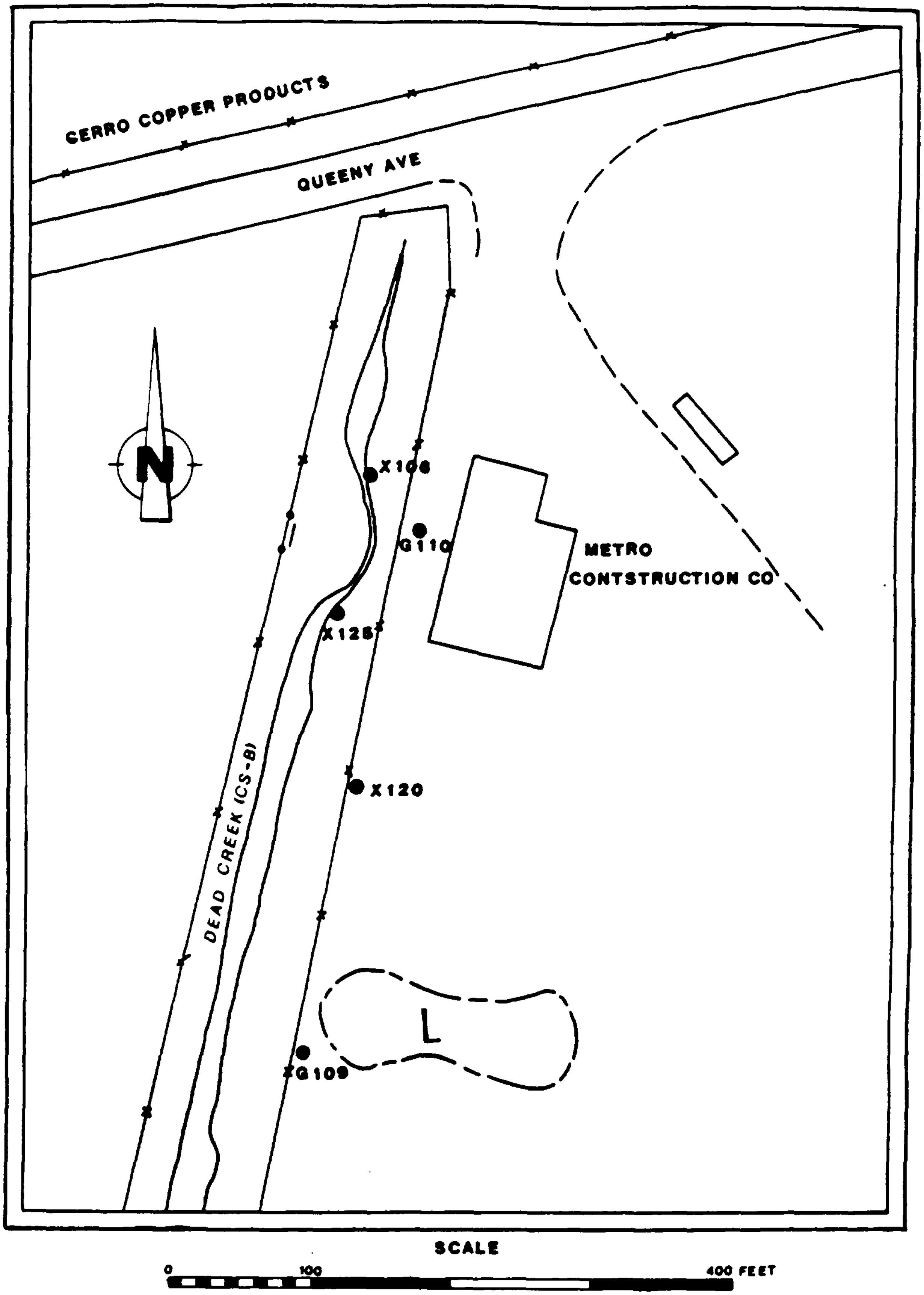
Site Description

Site L is the location of a former surface impoundment used by the Harold Waggoner Company to dispose of wash water from a truck cleaning operation. The impoundment was situated approximately 250 feet south of the present Metro Construction Company building, and approximately 125 feet east of Dead Creek (Figure L-1). The site is now covered with black cinders, and is used by Metro Construction Company for equipment storage. Several rows of heavy equipment are presently stored in the immediate area of the former impoundment. This equipment should be moved prior to any field activities.

Site History and Previous Investigations

Waggoner Company, owned and operated by Harold Waggoner, specialized in hauling industrial wastes for companies in the St. Louis/Metro East area. Harold Waggoner operated the company from 1964 to 1974, when he sold the operation to Ruan Trucking Company. Prior to 1971, Wagonner reportedly discharged wash water from truck cleaning operations directly to Dead Creek. In August 1971, the IEPA ordered Waggoner to cease discharging wastes to the creek. Subsequently, a pit was excavated for the purpose of storing wash waters, and the pit was used by Waggoner until 1974. Based on a review of historical photographs, the dimensions of this pit were determined to be roughly 70 feet by 150 feet. Ruan Trucking reportedly continued this practice of wash water storage until 1978. The property was then leased, and later purchased, by Tony Lechner of Metro Construction Company.

The IEPA calculated a rough estimate of the quantity of wash water disposed of in the impoundment between 1971 and 1978. This estimated volume, 164,000 gallons, is based on the assumption that Ruan Trucking operated at the same volume as Waggoner. The estimate is useful as a starting point for further calculations concerning



LEGEND

G110 IEPA MONITORING WELL
X120 IEPA SOIL SAMPLING LOCATION

FIGURE L-1
DEAD CREEK SITE AREA L WITH SAMPLING LOCATIONS

expected leachate migration rates and plume characteristics in the ground water aquifer. It should be noted that the impoundment was not lined, and the base consisted of medium to coarse grained sands.

Site L was identified in the IEPA St. John Report as a source of both ground water and surface water contamination in the area. The IEPA study included collecting several soil/sediment samples and one groundwater sample from areas downgradient of Site L. Results from analyses of sediment samples are presented in Table B-1, located in the Creek Sector B portion of this report. Results from the analyses of groundwater samples from the monitoring well downgradient of Site L (well G109) are included in Tables B-6, B-7, and B-8 (Creek Sector B).

Monitoring well G109, located approximately 100 feet west of the former impoundment, was found to be the most polluted well during IEPA's preliminary investigation. Also, during the installation of G109, drillers became nauseous from fumes at the well location. Initial sampling conducted by IEPA on October 23, 1980 indicated the presence of chlorophenol, phenol, and cyclohexanone, along with relatively high levels of heavy metals (Table B-6). Analyses from subsequent sampling events did not show organic contaminants, other than phenol. Arsenic, cadmium, copper, nickel, and phosphorus were detected at quantities significantly above IEPA's water quality standards. Other IEPA monitoring wells adjacent to the creek showed concentrations of these contaminants at least an order of magnitude (10 times) less than those found in G109. No other likely sources of contamination are known to exist in the immediate area. In view of these points, it is likely that contaminants found in well G109 are attributable to the former disposal impoundment (Site L).

Surface soil samples collected in the vicinity of Site L during the IEPA study include X106, X120, and X125 (Figure L-1). Samples X106 and X125 were taken from the creek bed, and X120 was taken from surface soil east of the creek in the general vicinity of the impoundment. Analyses of these samples are presented in Table B-1, which is located in the Creek Sector B portion of this report. High levels of several organic contaminants were detected in X125. These include alkyl benzenes, dichlorobenzene, dichlorophenol, hydrocarbons, naphthalenes, and trichlorobenzene at concentrations ranging from 78 to 21,000 parts per million (ppm). PCBs, including 10,000 ppm at X125, were detected in all three samples. Sample X106 was not analyzed for inorganic parameters, and concentrations of inorganics in X120 and X125 were only slightly higher than those found in the background soil sample X121 (see Tables B-1 and B-3).

Geophysical surveys were completed at Site L as part of the Dead Creek Project in December, 1985. These surveys included the use of EM and flux-gate magnetometry over a 200 feet by 200 feet grid in the area of the former disposal impoundment. Two rows of heavy equipment and trailers were present in the middle of the site at the time of the survey.

Magnetometer readings indicated a significant magnetic anomaly in the southwest corner of the site. Another large anomaly was observed between the rows of equipment; but an accurate assessment of the size and actual magnitude of the anomaly was not possible due to surface interference. An EM survey was conducted using different coil alignments to obtain readings from various depths. Shallow soundings indicated a single anomaly with the approximate dimensions of 150 feet by 100 feet in the southeast corner of Site L. Readings in this area were significantly higher than those obtained from a random check point in the cultivated field to the south. Deeper instrument penetration showed an anomaly that was similarly located in the southeast corner; however, the size and the magnitude of the readings were smaller than observed in the shallow investigation. Readings from the remainder of Site L showed no significant anomalies, although these readings were generally higher than those seen at the check point in the cultivated field. This is probably due to cinders covering the site, which are not present in the cultivated field.

Data Assessment and Recommendations

Investigations planned for Site L during the RI include subsurface soil sampling and soil gas monitoring. Ambient air monitoring will also be conducted as for all sites in the project.

Further activities necessary to provide adequate data for the feasibility study should include installation and sampling of 3 to 4 monitoring wells, and collecting additional subsurface soil samples. Subsurface soil sampling would be done in conjunction with well installation, and would provide additional data concerning migration of contaminants. The hydrology of the area also needs to be assessed to determine the interaction, if any, between the ground water and the creek.

Preliminary geophysical investigations and subsequent acquisition of historical aerial photographs indicate the likely presence of waste residues extending to the farmland to the south of Site L. Accordingly, additional surveys should be conducted south of the area initially surveyed. Additional geophysical investigations would allow better definition of the impoundment boundaries and also aid in delineating off-site migration of contaminants.

SITE M. HALL CONSTRUCTION PIT

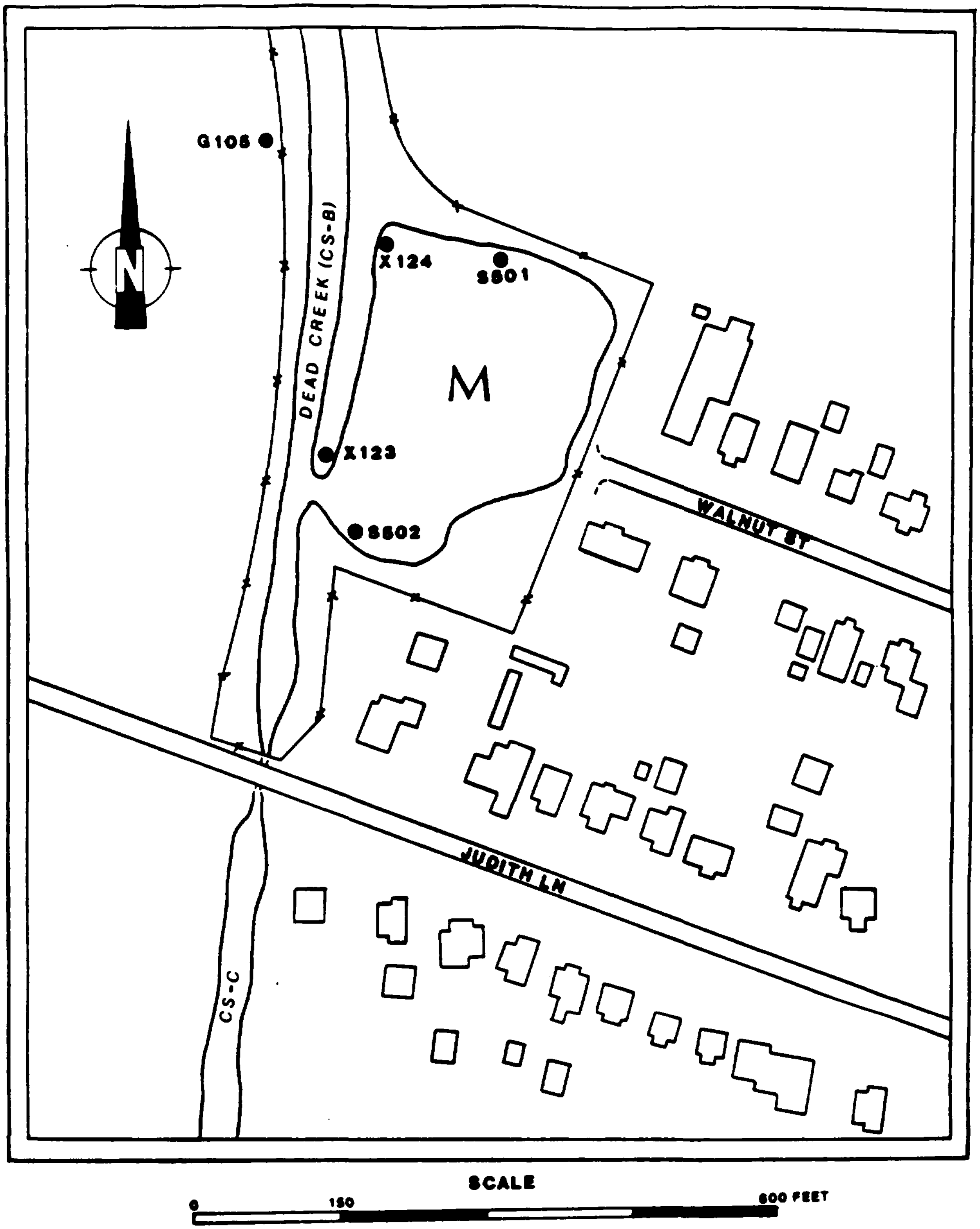
Site Description

Site M is a sand pit excavated by the H.H. Hall Construction Company in the mid to late 1940's. The pit is located immediately east of Dead Creek, and approximately 300 feet north of Judith Lane in Cahokia, Illinois (Figure M-1). The dimensions of the pit are approximately 275 by 350 feet. Presently, Site M is enclosed by a chain link fence, which also surrounds Creek Sector B. A small residential area is located just east of the pit on Walnut Street, which earlier served as an access road to Site M. The pit was excavated prior to any residential development on this street. Observations suggest that the pit is apparently isolated from Dead Creek by an embankment; however, this embankment may not be continuous. Aerial photographs indicate that a small break in the southern part of the embankment may allow flow between the creek and Site M. This possibility is supported by past IEPA inspections indicating discoloration in the pit similar to that observed in Dead Creek.

Site History and Previous Investigations

No information is available on file concerning waste disposal activities at Site M. It is possible that disposal did occur, since access to the pit remained unrestricted until a snow fence was erected in 1980. From review of historical aerial photographs, it is evident that minor changes in the dimensions of the pit have occurred. This could be an indication of filling around the perimeter of the pit. IEPA and the Cahokia Health Department have received numerous complaints about Site M and the creek from residents in the area. These complaints address, for the most part, seepage of odoriferous water into basements and problems associated with well water used to water gardens and lawns.

IEPA sampled several private wells in the area during the preliminary



LEGEND

G105 IEPA MONITORING WELL

X124 IEPA SEDIMENT SAMPLING LOCATION

S502 IEPA SURFACE WATER SAMPLING LOCATION

FIGURE M-1
DEAD CREEK SITE AREA M WITH SAMPLING LOCATIONS

hydrogeological study conducted in 1980. In addition, one sample of basement seepage from a home on Walnut Street near Site M was collected. Analytical results of these samples are presented in Table B-9, located in the Creek Sector B portion of the report. The results show concentrations of copper, manganese, and phosphorus above the state's water quality standards in one or more wells as well as in the basement seepage sample.

In conjunction with the creek sampling done in 1980, IEPA collected sediment and water samples from Site M. Analytical data for these samples are presented in Table M-1. In general, the water samples showed no significant contamination, although water quality standards for copper, phosphorous, and zinc were exceeded. Trace levels of PCBs (0.9 to 4.4 ppb) were found in both samples. The sediment samples, however, did show fairly high levels of several contaminants, including cadmium, chromium, copper, lead, nickel, zinc, and PCBs. In general, the samples closer to the break in the embankment separating Site M from Dead Creek showed higher levels of contaminants than the other samples.

Because water levels in the pit were approximately two feet higher than those found in the closest monitoring wells, the IEPA study concluded that there is no hydrological connection between water in the pit and the ground water aquifer. This assessment may or may not be accurate.

Data Assessments and Recommendations

The IEPA study conducted in 1980 showed significant contamination at Site M and identified specific waste types present. Investigation of Site M for the Dead Creek Project includes collecting two surface water and three sediment samples. A soil gas survey and ambient air monitoring will also be conducted at Site M. This sampling program will not provide sufficient data to adequately evaluate remedial alternatives. Core samples should be collected from the bottom of the pit in order to determine the types of wastes present and the

TABLE M-1:

ANALYSIS OF SURFACE WATER AND SEDIMENT SAMPLES FROM SITE M
(COLLECTED BY IEPA 9-15-80)

	SAMPLE LOCATIONS			
	Water		Sediment	
PARAMETERS	S 501	S 502	X 123	X 124
Alkalinity	80	85		
Arsenic	0.006	0.01		
Barium	0.2	0.5	4,400	350
Berylium			3	1
BOD-5	4	33		
Boron	0.2	0.2	-	25
Cadmium	-	-	40	4
Calcium			12,500	4,500
COD	58	85		
Chloride	27	28		
Chromium	-	-	150	50
Copper	0.035	0.33	18,700	4,500
Cyanide	0.02	-		
Flouride	0.4	0.4		
Iron	0.8	1.8	49,000	13,500
Lead	-	0.01	1,400	130
Magnesium	6	6	3,400	3,500
Manganese	0.06	0.82	200	80
Mercury	-	-		
Nickel	0.02	0.05	1,600	590
Phenol	0.01	0.01		
Phosphorus	0.17	0.31		
Potassium	5.9	6.2	950	1,000
Silver	-	-	30	6
Sodium	24	25	650	100
Strontium			175	27
Vanadium			42	19
Zinc	0.1	0.7	17,700	2,600
PCBs	0.0009	0.0044	1,100	24
Dichlorobenzene				

NOTE: All results in ppm.
Blanks indicate parameter not analyzed.
- Indicates below detection limits.

extent of vertical migration of contaminants that has occurred. In addition, several borings should be completed around the perimeter of the pit, including the embankment between the pit and the creek. It would also be necessary to verify that there is no hydrological connection between the water in the pit and the ground water aquifer. This would be best accomplished using continuous recording gauging stations at wells in the vicinity of the creek and at the pit. These activities would provide the information necessary to proceed with a viable remedial program.

SITE N - H.H. HALL CONSTRUCTION CO.

Site Description

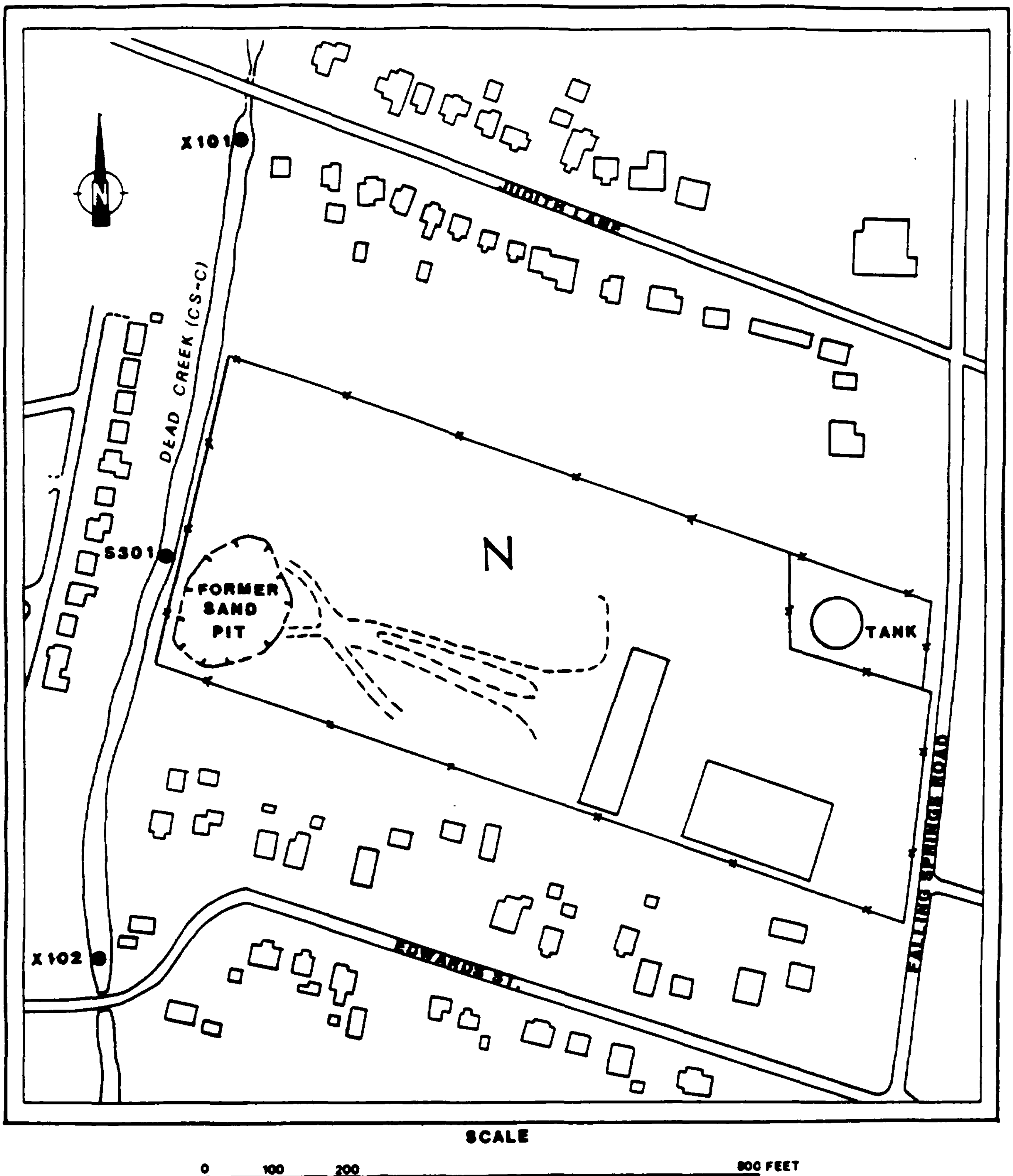
Site N is an operations and equipment storage facility for the H. H. Hall Construction Company of East St. Louis. The site is located in a residential/commercial neighborhood in the town of Cahokia, Illinois. Site N is bordered on the north by residential property along Judith Lane; on the west by Dead Creek; on the south by residential property along Edwards Street, and on the east by Falling Springs Road. The entire facility covers approximately 23 acres. Access to the site is restricted by a chain link fence.

Site History and Previous Investigation

Historical photographs indicate that a borrow pit existed at the facility which may have been used for waste disposal. The borrow pit, located in the southwest corner adjacent to Dead Creek, is roughly 4-5 acres in size (Figure N-1). No file information has been located concerning waste disposal at Site N. The pit has been filled and covered.

Historical photographs indicate that excavation at Site N began sometime prior to 1950. The presence of water in the pit was displayed in photographs from 1950, suggesting excavation into the Henry Formation aquifer. Hall Construction Company officials were recently contacted in an attempt to gather further information about the site. Apparently the pit was excavated in the late 1940's as a borrow pit for road construction materials. According to the officials contacted, concrete rubble and other demolition debris are the only wastes disposed of in the pit by Hall Construction. The area is presently covered with rubble and debris and is used only for equipment storage.

Although no analytical data has been developed for Site N, it should not be overlooked as a possible source of contamination in the area.



LEGEND

X101 IEPA SEDIMENT SAMPLING LOCATION

S301 IEPA SURFACE WATER SAMPLING LOCATION

FIGURE N-1

DEAD CREEK SITE AREA N WITH SAMPLING LOCATIONS IN CREEK SECTOR C

The site is located adjacent to Creek Sector C of Dead Creek, which has shown elevated levels of several contaminants, including PCBs. At this time, it cannot be determined if the contamination in Creek Sector C is the result of flow from the heavily-contaminated Creek Sector B, or the result of other unknown sources. It is also not known if access to Site N has always been restricted. Accordingly, the possibility exists that other parties may have used the pit for disposal.

Data Assessment and Recommendations

No sampling or field investigation data is presently available for Site N. Field activities scheduled at Site N during the Dead Creek Project include collecting three surface and two subsurface soil samples. In addition, a soil gas survey and ambient air monitoring will be conducted at the site. These investigations should be adequate to characterize the types of wastes present. The results of this sampling should also indicate if further investigation of the site is warranted.

If contamination is identified at the site, additional subsurface soil sampling and installation and sampling of groundwater monitoring wells should be carried out. This added investigation would be essential to complete feasibility study activities. In addition, depending upon subsurface conditions identified, a geophysical investigation may be of value to delineate pit boundaries and determine the presence of subsurface drum disposal. The hydrology of the creek in relation to the site should also be assessed to determine the potential for discharge from the pit to the creek.

SITE O - SAUGET WASTE WATER TREATMENT PLANT

Site Description

Site O is the Sauget Waste Water Treatment Plant and related property, located on Mobile Avenue in Sauget, Illinois. The property covers approximately 45 acres in a heavily industrialized area. The site consists of a series of four inactive sludge dewatering lagoons and a separate area of contamination. The former sludge lagoons cover approximately 20 acres to the south of the treatment plant buildings, and the identified contaminated area (3 acres) is located immediately west of the Sauget Waste Water Treatment Plant on the northwest corner of the property.

Site History and Previous Investigations

The Sauget Treatment Plant has been in operation in some form since approximately 1952. The plant primarily treats effluent from area industries, but also provides treatment for the entire Village of Sauget. Approximately ten million gallons per day (MGD) of waste water is treated at this facility, of which over 95 percent is from industrial sources. Area industries served by the Sauget Treatment Plant include Monsanto Chemical, Cerro Copper, Sterling Steel Foundry, Amax Zinc, Rogers Cartage, Edwin Cooper, and Midwest Rubber. Effluent from the treatment plant is directed to a National Pollutant Discharge Elimination System (NPDES) permitted discharge point in the Mississippi River.

The treatment plant has a long history of NPDES permit violations, for the most part due to the chemical quality of the plant effluent. Mercury, PCBs, and organic solvents have been detected at concentrations exceeding permit limits on several occasions. A USEPA study conducted in 1982 concluded that the treatment plant waste water contributed a substantial volume of priority, toxic pollutants annually to the Mississippi River. Since operations began, the plant has undergone several modifications and upgrades, increasing both capacity and effluent quality.

According to a Notification of Hazardous Waste Site Form submitted to USEPA in 1981, the former lagoons were used for disposal of clarifier sludges from 1965 to approximately 1978. The lagoons were designed to drain liquid from the sludge. The lagoons were not artificially lined, and were apparently excavated into the Henry Formation Sand. Initially, the sludge was not treated in any way after being placed in the lagoons. After an unknown period of time, lime was used for neutralization.

In 1982, IEPA personnel collected a sample of filter cake sludge from the treatment plant, which provides an indication of the chemical quality of sludges placed in the lagoons. Analysis of this sample showed several organic contaminants, including chlorinated benzenes, xylene, and aliphatic hydrocarbons, at concentrations ranging from 120 to 820 ppm. The lagoons are presently covered with two feet of clay and have been vegetated. Sludges from the Sauget Treatment Plant, which is still in operation, are presently taken to two IEPA-permitted landfills in the St. Louis Metro-East area.

Extensive construction/excavation has been done since 1981 in the area surrounding the Sauget Treatment Plant. The new American Bottoms Regional Treatment Plant, completed in 1985 but not on line as yet, is located immediately south of the former sludge lagoons. Several problems involving chemical wastes were encountered during excavation work for the construction of this facility. In 1984, workers uncovered a black, tar-like substance with a strong solvent odor while digging a trench for sewer and water lines to the new treatment plant. Although file information is sketchy concerning the exact location of this incident, it is thought to be in the southern portion of Lagoons 3 and 4 (Figure O-1). Two samples of the waste material were collected by Envirodyne Engineers, Inc. (EEI) of St. Louis, and a limited organic analysis was run. Both samples showed the presence of PCBs (477 to 653 ppm), phenol (0.28 to 12.0 ppm), and oil and grease (29 to 35 percent). Benzene was also detected at

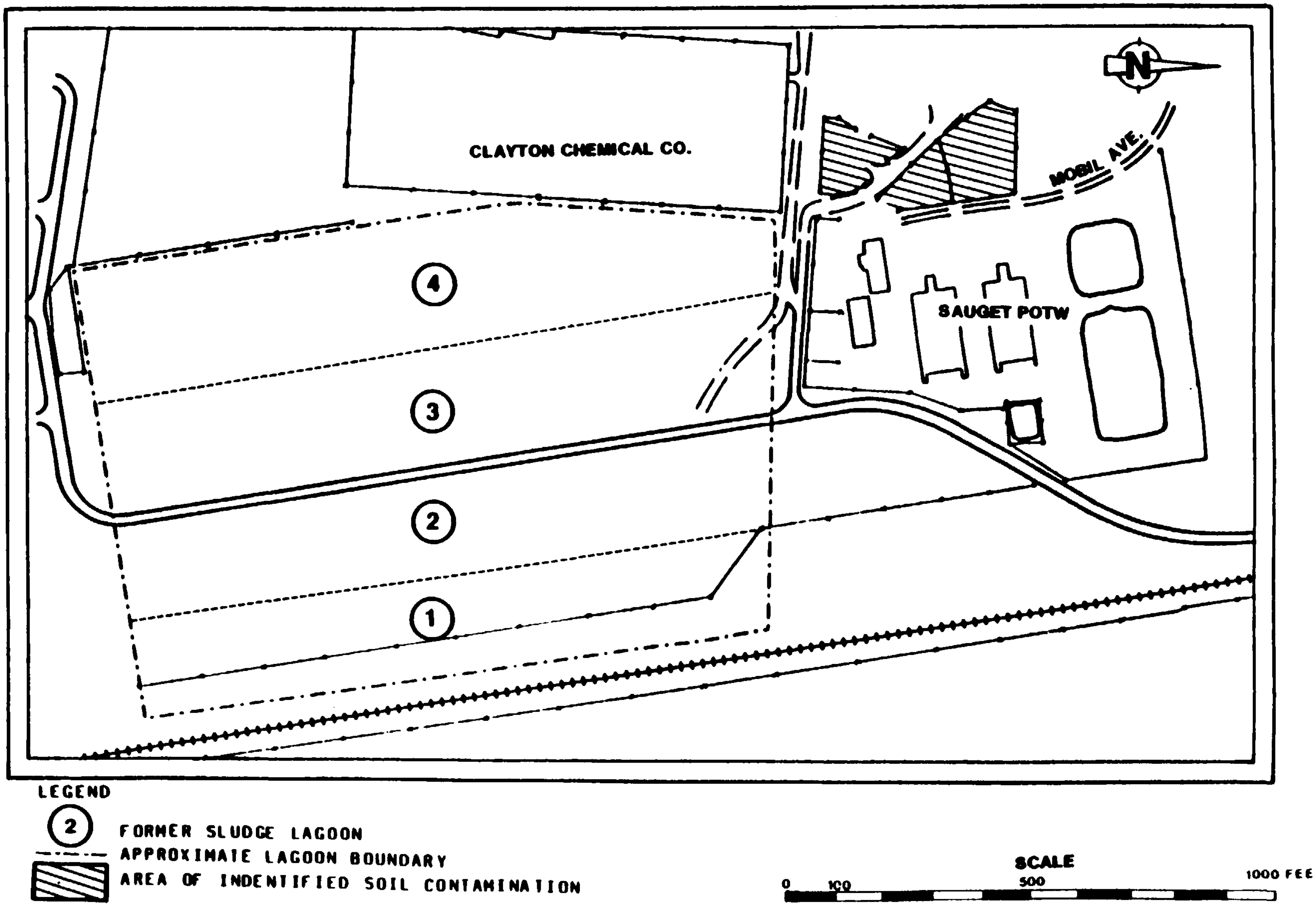


FIGURE 0-1
FORMER SLUDGE LAGOONS AND CONTAMINATED SOIL AREAS AT SITE 0

trace levels (1 ppb) in both samples.

Several additional locations have reportedly been sampled by EEI as a result of uncovering waste materials during excavation activities around the Sauget Treatment Plant. However, attempts to gather information concerning specific sample locations and analytical data have been of limited success. Chemical data for two soil samples collected from excavated soil piles in the area of the former sludge lagoons was acquired. These results are shown in Table O-1. Both samples show high levels of several chlorinated organics and other priority pollutants. Values were listed for total PCBs, however, the PCB results could not be verified by the laboratory. Although limited data has been acquired, available data indicates that the former sludge lagoon area likely contains widespread organic and inorganic contamination.

In 1983, IEPA identified another highly contaminated area at Site O. This area is located directly west of the existing treatment plant and approximately 200 feet north of the Clayton Chemical Company property (Figure O-1). IEPA and EEI personnel conducted a cooperative sampling effort in this area during February and March of 1983. A total of 33 surface and subsurface soil samples were collected and analyzed for PCBs and TCDD (samples collected in March were analyzed for TCDD only). Analytical results for these samples are shown in Tables O-2 and O-3. The results of initial sampling done in February show relatively high levels of PCBs in all samples, including those taken to a depth of 14 inches. Sample location 5, in the area of a proposed effluent-pump station, was the only location where TCDD was detected in the initial sampling. Based on the results from samples collected in February, it was determined that further sampling would be necessary. In March, 1983, 21 soil samples were collected from 10 locations in the area of the initial sampling. Depths of these samples ranged from 0 to 28 inches. Sample number 14 was a composite of several soil piles, and samples 10A and 10B were spiked control samples. The results of these samples indicate significant TCDD contamination throughout the area. Sample locations

TABLE O-1: IDENTIFIED ORGANIC COMPOUNDS IN SAMPLES FROM TRENCH EXCAVATION AT SITE O (COLLECTED JULY 20, 1984 BY RUSSELL AND AXON, INC.)[a]

	SAMPLE LOCATIONS		
PARAMETERS	SAMPLE 1	SAMPLE 2	BLANK
2,4-Dichlorophenol	50.1		
Pentachlorophenol	3,600	159	
2,4,6-Trichlorophenol	39.3		
Crysene	123	2.2	
Benzo-k-Fluoranthene	15.9	0.45	
Bis(2-Ethylhexyl) Phthalate	10.9		0.098
1,2-Chlorobenzene		12.2	
1,4-Dichlorobenzene		8.01	
Di-Butyl Phthalate		5.06	0.1
Phenanthrene	100	1.6	
Pyrene	102	2.1	
1,2,4-Trichlorobenzene	65.3	1.6	
PCBs	*	*	
Benzo(a)Pyrene	4.2	1.0	

NOTE: All results in ppm.
Blanks indicate compound not detected.
* Identified, but values cannot be verified.
a Analysis performed by Envirodyne Engineers, Inc. (EEI), St. Louis, MO.

TABLE 02: ANALYTICAL RESULTS FOR SOIL SAMPLES AT SITE O (SPLIT SAMPLES COLLECTED FEBRUARY 19, 1983 BY IEPA AND EEI)

	PARAMETERS				
SAMPLE NO. (Depth)	PCB - IEPA	PCB - EEI	TCDD - IEPA[a]	TCDD - EEI	Comment
1 (0" - F")	1,500	3,690			
2A (0"- F")	7,600	5,350			
2B (7" - 13")	390	716			
3A (0" - 7")	9,100	137,250			
3B (7" - 13")	40	28			
4A (0" - 6")	20,000	21,020			
4A (0" - 6")	-	15,510			Duplicate-EEI
4B (6" - 13")	54,000	149,600			
5A (0" - 6")	32,000	112,930	18	28	
5A (0" - 6")	-	-	17	-	Duplicate-IEPA
5B (6" - 14")	20,000	12,050	4.1	5.1	
6 (0" - 8")	120	90			

NOTE: All results in ng/g (ppb).
Blanks indicate below detection limits.
\- Indicates parameter not analyzed.
a Hazelton Raltech, Inc. performed TCDD analysis for IEPA.

TABLE 0-3: ANALYTICAL RESULTS FOR SOIL SAMPLES AT SITE 0. (SPLIT SAMPLES COLLECTED MARCH 12, 1983 BY IEPA AND EEI)

SAMPLE NO. (Depth)	PARAMETERS TCDD - IEPA[a]	TCDD - EEI	COMMENTS
7A (0"- 6")			
7B (8" - 16")	1.8	44	
8A (0" - 6")	77	Interferences	
8B (6" - 12)	*	19	
8C (13" - 18")		37	
8D (18" - 25")		56	Duplicate
8D (18" - 25")			
9A (0" - 6")	1.3		
9B (6" - 12")	*		
9C (14" - 21")			
9D (22" - 28")	0.92		Control Sample
10A	12		Control Sample
10B	*	13	
11A (0" - 6")			
11B (G" - 18")	*		
12 (10" - 19")	*		
13A (0" - 7")			
13B (7" - 18")	13	13	
14 (0" - 6")	25	170	Composite of soil samples
15 (0" - 16")			
16 (0" - 18")			

<u>NOTE:</u> All results in ng/g (ppb).
Blanks indicate below detection limits.
* Sample not collected by IEPA.
a Hazelton Raltech, Inc. performed TCDD analysis for IEPA.

8, 15 and 16, all near the proposed pump station, showed the highest concentrations of TCDD (ranging from 13 to 170 ppb).

Based on the results of the sampling done in February and March, 1983, USEPA estimated that 2800 cubic yards of contaminated soil existed at the site. Further sampling was proposed by USEPA to determine the extent of PCB and dioxin contamination, and plans were prepared by Russell and Axon, Inc., a contractor for the Village of Sauget, for a temporary containment facility for the contaminated soil. The USEPA, IEPA, the Village of Sauget, and contractors representing the village were involved in discussions concerning possible remedial alternatives for the contaminated soil. However, no remedial actions have been implemented to date. Presently, a fence encloses the contaminated area, and the surface has been covered with gravel.

The source of the PCB and dioxin contamination on the northwest portion of the site has not been conclusively determined. A likely source is a tank owned by Bliss Waste Oil of Missouri, which was located on the Clayton Chemical Company property. Bliss Waste Oil had four above-ground storage tanks located in the northern portion of Clayton's property which were used to store waste oil and diesel fuel. In February, 1983, a former employee of Bliss informed IEPA of a leaking underground storage tank owned by Bliss in the area of the other tanks. This tank was apparently used to drain unwanted liquid from the above ground tanks.

IEPA located the underground tank and conducted preliminary sampling an excavated area around the tank. Analysis of these samples detected significant levels of PCBs and other priority pollutant organic compounds. In June, 1983, the underground tank was removed by a contractor for Russell Bliss (the former owner), and additional sampling was done to determine the extent of remaining soil contamination. Liquids and sludges in the tank were containerized, along with contaminated soil from the excavation. All containerized materials were removed to a licensed hazardous waste facility by November, 1983.

Data Assessment and Recommendations

Based on the information outlined above, there is significant and widespread contamination in the area of the Sauget Treatment Plant. Additional information is available from Russell and Axon, Inc., and further attempts should be made to secure all data pertaining to chemical wastes in the area from this contractor. A signifcant amount of analytical data has been generated for the contaminated area west of the treatment plant. However, the horizontal and vertical extent of contamination has not been assessed. Similarly, very little data is available with respect to the former sludge lagoons which would be useful in proposing remedial alteratives.

The present scope of work for this project includes only collecting and cataloging all data pertaining to Site O. Wastes have been characterized in the area west of the treatment plant, and two major contaminants have been identified to a depth of 28 inches in this area. Data is also available from samples taken in the vicinity of the former sludge lagoons which provides an indication of possible waste types present in the lagoons. The approximate boundaries of the lagoons can be determined based on a review of historical aerial photographs. The data generated to date for Site O indicates that further field investigation is warranted. In order to define and specify remedial alternatives, the areas of surface and subsurface soil contamination need to be accurately defined. In addition, since the sludge lagoons are not lined, and may have been excavated into the Henry Formation aquifer, a strong possibility for ground water contamination exists.

For the former sludge lagoons, it is recommended that soil borings be completed into the lagoons to a depth sufficient to assess the vertical migration of contaminants from the lagoons. The borings should be located so as to provide intersecting cross sections for mapping purposes, and should cover the entire lagoon area. Samples should be composited for ten foot intervals for each boring and analyzed for all hazard substance list (HSL) compounds. These borings and samples would provide adequate characaterization of the chemical constituents present in the lagoons and provide information concerning vertical migration of contaminants. In addition, four deeper borings should be completed around the periphery of the lagoons to determine if, or to what extent, wastes have migrated from the lagoons. Detailed field screening would be done on samples from these borings using a portable gas chromatograph (GC). A geophysical investigation using electromagnetics would be completed in conjunction with these borings to define the lateral extent of any contaminant plume that may be present. If initial borings into the lagoons indicate that ground water monitoring is necessary, the deeper borings around the periphery could be used for monitoring well emplacement.

The identified area of soil contamination west of the treatment plant should be more accurately defined. Recommendations for this area include completing several test borings in the area to determine the maximum depth of contamination, followed by grid sampling to accurately define the contaminated area. Samples collected from the test borings could be extracted and analyzed for PCBs in the field using GC. Since they were found at high concentrations in previous samples, PCBs would be a good indicator for other possible contaminants. Following the determination of the maximum depth of contamination, a detailed sampling program should be developed and conducted in order to define the extent of contamination.

SITE P - SAUGET/MONSANTO LANDFILL

Site Description

Site P is an inactive, IEPA-permitted landfill covering approximately 20 acres in Sauget, Illinois (Figure P-1). The site is bordered on the west by the Illinois Central Gulf Railroad; on the south by Monsanto Avenue, and on the east by the Terminal Railroad Association railroad. The two railroads converge to delineate the north boundary. Generally, the geology at the site consists of silty sand, underlain by fine grained to silty clay, followed by fine to coarse grained sands down to the bedrock. Surface drainage is to the south-central portion of the site, which was not landfilled due to the presence of a potable water line in this area. A depression area is also found along the east perimeter, adjacent to the Terminal Railroad. Surface drainage will not leave the site due to the presence of railroad embankments along the perimeter and the depression in the central portion of the site.

Site History and Previous Investigations

Sauget and Company entered into a lease agreement with the Union Electric Company in St. Louis to operate a waste disposal facility in 1972. In January 1973, IEPA issued an operating permit to Sauget and Company to accept only non-chemical waste from Monsanto. Sauget and Company subsequently applied for, and was granted, a supplemental permit in 1974 which allowed acceptance of general waste and diatomaceous earth filter cake from Edwin Cooper, Inc. (now Ethyl Corp.). The IEPA began conducting routine inspections of the facility in 1974, at which time no violations were evident. In October 1975, an inspector observed a small amount of yellowish, tar-like liquid in an area adjacent to several crushed fiber drums which were labelled "Monsanto ACL-85, Chlorine Composition." Sauget and Company and Monsanto were subsequently notified of this permit violation, and the matter was not further addressed. The site was operated in general compliance until December 1977, when an

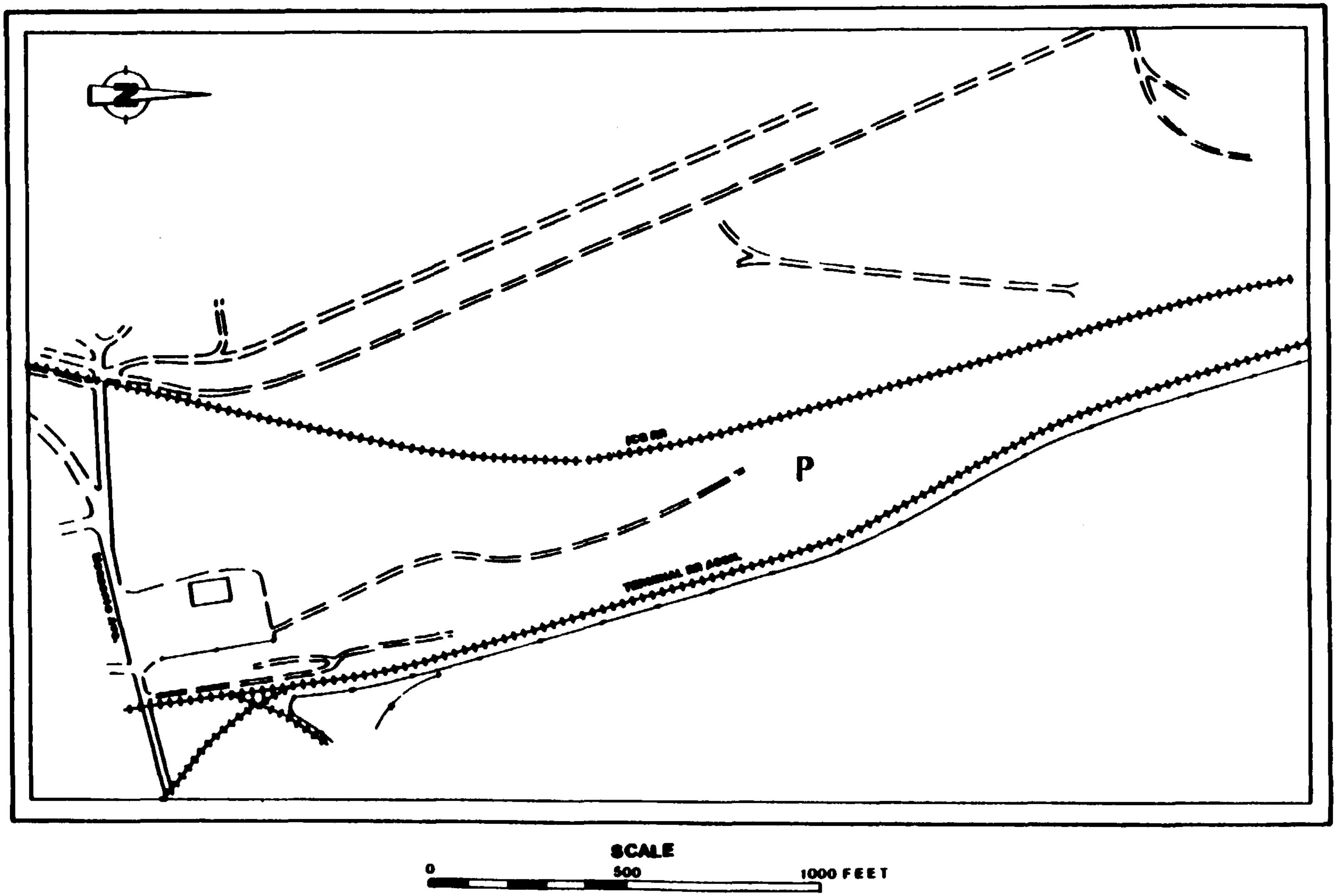


FIGURE P-1
DEAD CREEK SITE AREA P

inspection revealed the disposal of approximately 25 metal containers (12-15 gallon) full of phosphorus pentasulfide (P_2S_5), a flammable solid. Monsanto was required to excavate and remove all of this material from the site, and to discontinue disposal of any chemical wastes or packagings.

The IEPA became aware of another potential problem at this time, specifically the use of a Southern Railway slag pile for intermediate and final cover material. Analysis of this slag showed it to be unsuitable as cover due to its high permeability and heavy metal content. Cinders were also used as cover material at Site P, and are expected to pose the same problems as the slag; that is, increased surface water infiltration and the resulting potential for leaching heavy metals along with organic wastes into the groundwater.

State inspections in 1978 and 1979 indicated unpermitted disposal of Monsanto ACL filter residues and packagings. The composition of this material is not known. According to the site operator at that time, this material would occasionally ignite when in contact with the filter cake waste from Edwin Cooper.

An Illinois American Water Company distribution main was discovered in 1980 during preparatory excavation on the southern portion of the site. The south one-third of the property was purchased from Illinois Central Gulf in 1971 by Paul Sauget. Following discovery of the water line, Site Plans and permits were modified to include no waste disposal within 100 feet of the line.

Review of available IEPA records indicates that the Edwin Cooper filter cake is the only industrial process waste that was reported to have been disposed of at Site P. Records indicate that approximately 117,000 cubic yards of this material was accepted. The filter cake was classified as non-hazardous on special waste authorization permit number 7400017, based on EP toxicity results submitted in 1973. Additional analytical data is available for a filter cake composite sample from Edwin Cooper in 1979 which indicates elevated levels of lead (18.4 ppm), cadmium (1.8), zinc (7,220 ppm), and a pH of 11.22. No groundwater monitoring program has been established for Site P, nor have wastes at the site been adequately characterized. No sampling or other field investigation activities have been conducted, other than routine IEPA inspections, at the site.

Data Assessment and Recommendations

A groundwater study consisting of installation and sampling of 6 wells is the only planned field investigation for Site P during the Dead Creek Project. Additional investigation will be necessary to adequately characterize the site and to provide an adequate data base for conducting the feasibility study if groundwater contamination is detected. Further evaluation of subsurface soil conditions at the site would be necessary in order to define waste characteristics and the vertical and lateral extent of contamination so that remedial alternatives can be assessed.

SITE Q - SAUGET/SAUGET LANDFILL

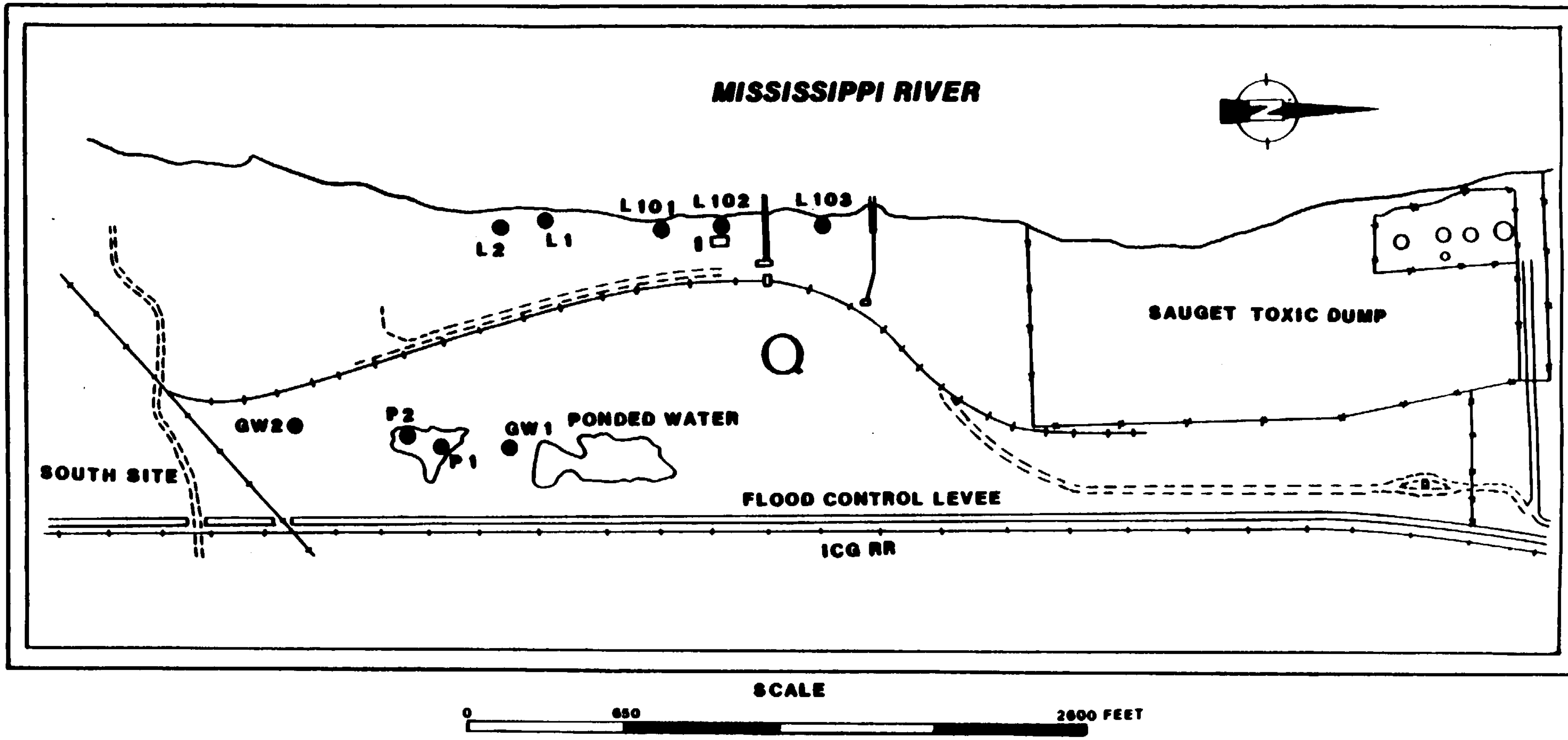
Site Description

Site Q is the Sauget/Sauget Landfill, an inactive waste disposal facility operated by Sauget and Company between the years 1966 and 1973. The site is approximately 90 acres in size, including a southern extension, as delineated by the Alton and Southern Railroad tracks (Figure Q-1). The site is located on east bank of the Mississippi River and is also on the river side of a U.S. Army Corps of Engineers flood control levee. Site Q is also situated immediately east of Site R, commonly known at Sauget Toxic Dump, a chemical waste disposal facility owned by the Monsanto Chemical Company.

Site Q was operated without a permit from IEPA, although registration with the Illinois Department of Public Health was obtained for the north site in 1967, prior to the formation of the IEPA. The site is presently covered with black cinders, which is an unsuitable cover material due to its high permeability. Site Q is presently owned by the Riverport Terminal and Fleeting Company, and the property is leased to the Pillsbury Company. Pillsbury operates a coal unloading facility at the site.

Site History and Previous Investgations

Disposal operations at Site Q began in approximately 1966 in the northernmost portion of the property. A Union Electric Company flyash pond existed at the site in an area immediately south of Monsanto's chemical dump. IEPA inspections in the early 1970's documented several violations of the Illinois Environmental Protection Act, including open burning, use of unsuitable cover materials (cinders and flyash), and acceptance of liquid chemical wastes. Septic tank pumpings were also accepted at the site from approximately 1968 to 1972, and were apparently co-disposed with general municipal refuse.



LEGEND

GW1	IEPA GROUNDWATER SAMPLING LOCATION
P1	IEPA SURFACE WATER SAMPLING LOCATION
L1	IEPA LEACHATE SAMPLING LOCATION

FIGURE Q-1
DEAD CREEK SITE AREA Q WITH SAMPLING LOCATIONS

in April, 1971, a complaint was filed by IEPA against Sauget and Company for the violations mentioned above. The company was ordered to cease and desist open burning, accepting liquid chemical wastes, open dumping, and use of cinders and flyash as cover material. In July, 1972, a smoldering underground fire was observed by IEPA inspectors at the site. The fire continued to smolder until October, 1972 despite repeated attempts to extinguish it. Underground fires were a continuing problem, as documented by later IEPA inspection reports. In the spring of 1973, flood waters from the Mississippi River inundated Site Q. This condition persisted into the fall, and operations at the site were discontinued. Exposed refuse was observed being carried downstream in the river at that time.

Sauget and Company filed a permit application to IEPA in 1972 for a proposed extension to the existing landfill. The proposed extension was located south of the Alton and Southern railroad tracks, and will be referred to as the south site. IEPA denied issuance of a permit for this extension several times, as Sauget and Company had filed repeated applications. Although approval of the south site was never issued, disposal operations continued in this area.

In the early 1970's, IEPA collected several samples from Site Q. Approximate sample locations are shown in Figure Q-1. Analytical data for samples collected from ponded water, leachate seeps, and ground water are provided in Table Q-1. The first set of samples, collected in October, 1972, consisted of one sample from ponded water, and one leachate sample. The results for these samples show the presence of several metals, including copper, iron, lead, mercury, and zinc. Ground water samples were collected in January, 1973 from two monitoring wells at Site Q. Information regarding construction details for these wells has not been located. Sample GW-1 showed trace levels of cadmium, silver, and phenols, while GW-2 showed very little evidence of contamination. Samples were again collected by IEPA from ponded water at Site Q on two occasions in April, 1973. Analytical results showed low levels of boron, cadmium, copper, iron, lead, manganese, mercury, nickel, and zinc in sample

TABLE Q-1: ANALYSIS OF SURFACE AND GROUND WATER SAMPLES COLLECTED BY IEPA AT SITE Q

	SAMPLE LOCATIONS AND DATES					
	10/17/72		1-17-73		4-10-73	4-26-73
PARAMETERS	P-1	L-1	GW-1	GW-2	P-2	P-3
Calcium	80	56	310	137	250	280
Magnesium	8	26	57	205	42	44
Sodium	23	169	275	13	230	205
Potassium	6	30	10	4	85	70
Ammonia	0.19	21	NA	NA	32	36
Boron	7	6.5	NA	NA	2.6	2.8
Cadmium			0.02		NA	0.02
Chromium (Total)					NA	0.03
Copper		0.01			0.02	
Iron		46			60	67
Lead		0.02			0.07	0.07
Manganese					6	6.5
Mercury (ppb)	0.5	0.5			0.4	0.6
Nickel					0.3	0.2
Silver			0.01			
Zinc		0.2		0.1	4.2	5
Alkalinity	46	810	645	375	420	
Chloride	19	4	310	24	210	205
Nitrate	NA	NA	NA	NA	NA	
Phosphate	NA	NA	NA	NA	3.7	5
Sulfate	230	18	325	25	350	270
Hardness	240	560	NA	NA	970	930
Phenols	NA	NA	0.02		NA	NA

NOTE: All results in ppm unless noted otherwise.
Blanks indicate below detection limit.
NA indicated parameter not analyzed.
P = Ponded water, L = Leachate, GW = Groundwater

P-2 and/or P-3. Although the data from samples collected in the early 1970's showed the presence of several contaminants, most notably phenol and heavy metals, no conclusive evidence of contamination at Site Q was obtained.

IEPA collected samples from leachate seeps along the Mississippi River in October, 1981 and again in September, 1983. The locations of these samples are shown in Figure Q-1, and analytical results are presented in Table Q-2. Data for the 1981 samples shows elevated concentrations of arsenic, chromium, copper, lead, managanese, and phosphorus in both samples. Additionally, low levels of phenols and PCBs were detected in the samples. The samples collected in September, 1983 show very similar results. Heavy metals and PCBs were again detected at concentrations very close to those seen in the earlier samples.

The cinders and flyash used as cover materials at Site Q have been the subject of numerous investigations and complaints by IEPA. In addition, the depth of final cover has been deemed inadequate, and enforcement action is pending on this matter. The Illinois Pollution Control Board Case Number 77-84 was filed against Sauget and Company and Paul Sauget in May, 1977. As a result of the findings in this case, a monetary penalty was invoked, and Sauget and Company was ordered to place two feet of suitable cover material on the entire site by February, 1981. Sauget's failure to comply with these orders led the Illinois Attorney General's office to file a similar case. Site Q has been a chronic enforcement problem, and recently Paul Sauget was found in contempt of court for failure to comply with court orders.

Laboratory tests run on the cinders and flyash indicate permeability values in the range of 9×10^{-3} centimeters per second, which is considered unsuitable by IEPA. In addition, metals analysis of the cover material showed unacceptably high levels of arsenic, copper, lead, and zinc. In 1972, IEPA collected samples from stockpiled flyash at Site Q, and ran leach tests for inorganic constituents.

TABLE Q-2: ANALYSIS OF LEACHATE SAMPLES FROM SITE Q (COLLECTED OCTOBER 28, 1981 AND SEPTEMBER 29, 1983 BY IEPA)

SAMPLE LOCATIONS AND DATES

PARAMETERS	10-28-81		9-29-83		
	L-1	L-2	L101	L012	L103
Alkalinity	255	293	191	158	242
Ammonia	3.8	2.8	6.5	4	3.7
Arsenic	0.057	0.022	0.11	0.034	0.012
Barium	0.8	0.2	0.5	0.4	0.3
Boron	5.8	5.6	37.5	42	23
Cadmium					
COD	445	35	87	94	71
Chloride	15	17	23	22	31
Chromium (Total)	0.08		0.03	0.01	
Copper	0.2	0.04	1.2	0.06	
Cyanide				0.01	0.01
Hardness	1330	1220	1225	1360	1045
Iron	207	17.5	86	36	6.4
Lead	0.26		0.13	0.08	0.02
Magnesium	145	67	81	73	44.5
Manganese	7.7	34	6.7	6.8	2.7
Mercury					
Nickel	0.3		0.1	0.1	
Nitrate	0.24	0.4	0.21	6.1	1.8
Phosphorus	6.1	0.74	3.1	1.3	0.86
Potassium	16.5	9.5	13.4	13.5	17
R.O.E.	1980	1829	1880	2118	1563
Silver	0.02	0.01	0.01		
Sodium	55.7	53.3	56	70	51
Sulfate	1196	1059	1200	1350	900
Zinc	1.2	0.2	0.3	0.2	
Phenol	0.005	0.005			
PCBs (PPB)	0.7	1	0.5		0.1
2,3-D(PPB)					

NOTE: All results in ppm unless noted otherwise.
Blanks indicate below detection limits.

Samples were taken from piles estimated to be 5 years old, 1 year old, and fresh material to determine the types and quantities of contaminants being leached from this material at the site. Analytical data for these samples are shown in Table Q-3. Analysis of the first set of samples (August, 1972) shows a distinct trend of the more soluble compounds, such as calcium, sodium and potassium, being leached from the fresh ash. However, the second set of samples, collected in October 1972, does not show a similar trend. The reasons for this discrepancy are not clear. The data in Table Q-3 also shows that significant quantities of metals are contained in the ash, particularly for the material estimated to be five years old.

IEPA's Notices of Violations concerning disposal of chemical wastes at Site Q in early inspections are supported by more recent information. Notification of Hazardous Waste Site Forms were submitted to USEPA from three companies for this site. These notifications indicate disposal of organics, inorganics, solvents, pesticides, paint sludges, and unknown wastes at the site. In May, 1980 workers uncovered buried drums and unknown wastes while excavating for construction of a railroad spur on the property. Workers observed a haze or smoke rising from the material after it was uncovered, suggesting corrosive and/or reactive properties.

In November, 1985, IEPA received a sketch from a reporter for a St. Louis newspaper indicating the location of buried drums containing PCBs. The reporter's source of this information is not known, nor has the information been verified to date.

As a result of the May, 1980 incident in which buried drums were unearthed, USEPA tasked its FIT contractor (Ecology and Environment, Inc.) to perform a detailed study to determine the extent of chemical contamination at Site Q. The study included a systematic geophysical investigation using EM, magnetometry, and ground penetrating radar (GPR), followed by a drilling and sampling program to investigate possible subsurface contamination. The investigation was limited

TABLE Q-3: ANALYSIS OF FLYASH USED AS COVER FROM STOCKPILES AT SITE Q (SAMPLED BY IEPA IN 1972)

SAMPLE NUMBERS AND DATES

PARAMETERS	8/3/72			10/16/72		
	5 Years	1 Year	Fresh	5 Years	1 Year	Fresh
Calcium	125	245	285	580	120	130
Magnesium	4.6	6.4	0.5	9	2	
Sodium	10	7.5	58	140	1.3	36
Potassium	7	11	79	56	2	45
Ammonia	1.8	0.36	0.47	0.75	0.05	0.15
Arsenic	NA	NA	NA			0.02
Barium	0.1		0.1			
Boron	0.9	3.6	1.8	1.3	0.6	2.4
Cadmium	0.01	0.01	0.02	0.02		
Chromium				0.03		
Copper	0.09	0.01	0.01	0.06		
Iron	1.3	0.1		0.85	0.1	
Lead	0.03			0.02	0.01	0.02
Manganese	0.69	0.03	0.03	0.75		
Mercury (ppb)	6			6.2		
Nickel	0.1	0.1	0.2	0.12	0.05	0.05
Silver	0.005	0.005	0.005			
Zinc	0.8	0.1		1.05	0.05	0.02
Alkalinity	140	65	120	120	80	135
Chloride	10	12	60	150	4	49
Flouride	0.2	0.2	0.1	0.3	0.3	0.2
Phosphate	NA	NA	NA	1.6	0.07	0.05
Sulfate	290	950	1300	1600	250	270
Hardness	420	1000	1400	1600	340	350
COD	250	33	52	460	26	45

NOTE: All results in ppm unless noted otherwise.
Blanks indicate below detection limit.
NA indicates parameter not analyzed.

to the northern portion of the site which amounts to approximately 25 percent of the site area.

Technos, Inc. of Miami, Florida was contracted to perform the geophysical investigation. This investigation was completed in June 1983. Results of the geophysical investigation identified the probable limits of landfilling and burial zones of relatively large concentrations of iron bearing materials such as drums or car bodies. These iron bearing zones were found in several distinct locations in the north-central and western portions of the study area.

Following the geophysical investigation, a drilling/sampling program was conducted to determine if subsurface soils were contaminated. The program consisted of drilling 18 test borings through the landfill, and collecting 35 soil samples for full priority pollutant analysis, as designated by USEPA. Subsurface soil samples were collected at depths ranging from 10 to 26 feet. Sample locations are shown in Figure Q-2. Analytical data for the soil samples are shown in Table Q-4, which consists of five pages. As can be seen in the table, a wide variety of organic compounds were detected at high concentrations in these samples. The sample analysis consisted of testing for 112 organic compounds, and 63 compounds were confirmed to be present in the subsurface samples.

Specifically, the data showed that thirty-four organic compounds were found at concentrations of 10 ppm or greater. Of these 34 compounds, 20 compounds were detected at concentrations 100 ppm or greater. And of these 20 compounds, 7 compounds were detected at concentrations of 1000 ppm or greater. Compounds detected at concentrations of 1000 ppm or greater include 2,4-dichlorophenol, 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, bis(2-ethylhexyl) phthalate, toluene, o-xylene, and PCB-1260. In addition, 2,3,7,8-TCDD was detected in two samples (B4B and B8B). Compounds detected in samples taken from Site Q include many of the same compounds as detected in samples taken from Site R, the Sauget Toxic Dump site. Contamination was detected

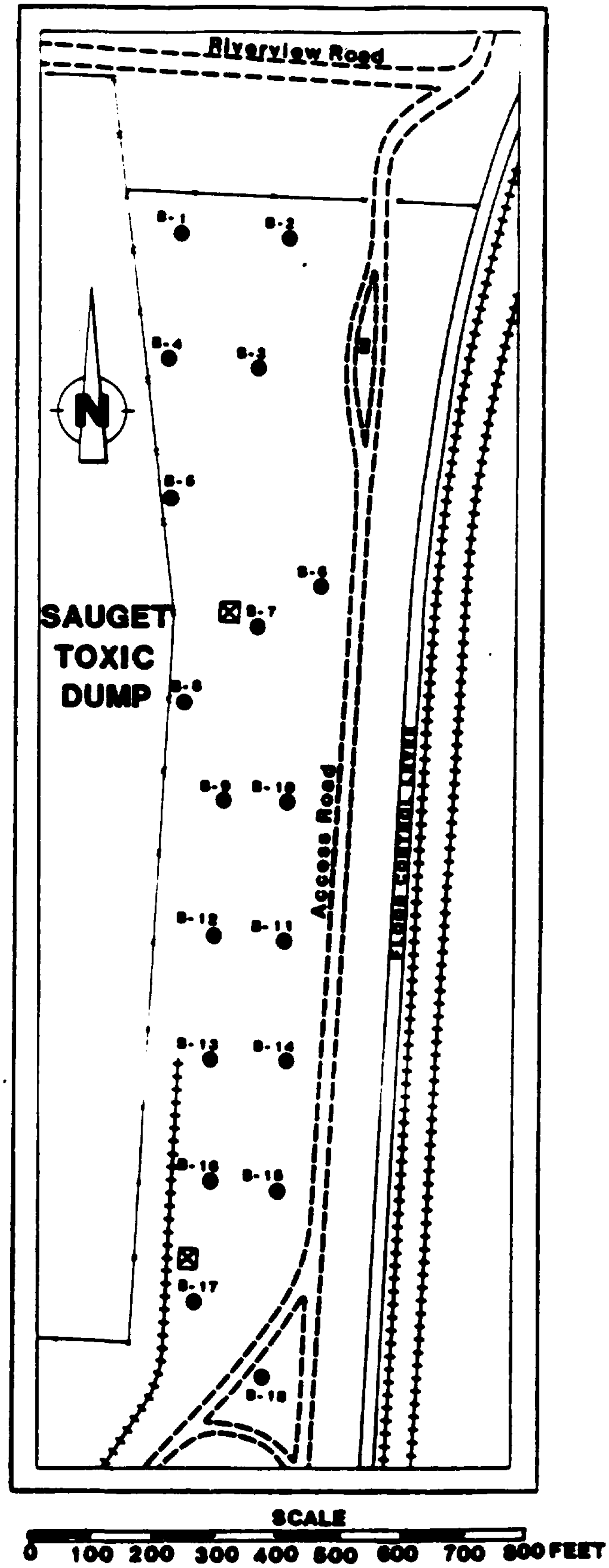


FIGURE Q-2
USEPA - FIT SUBSURFACE SOIL SAMPLING LOCATIONS AT SITE Q

TABLE Q-4: IDENTIFIED ORGANIC COMPOUNDS IN
SUBSURFACE SOIL SAMPLES FROM SITE Q
(SAMPLES COLLECTED JULY 13, THROUGH JULY 20, 1983
BY ECOLOGY AND ENVIRONMENT, INC.)

	BORING/SAMPLE NUMBER DEPTH (in feet)							
PARAMETERS	B1A 10.0-11.5	B1B 17.5-19.0	B2A 13.5-15.5	B2B 17.0-19.0	B3A 10.0-12.0	B3B 13.5-15.5	B4A 10.0-12.0	B4B 13.5-15.5
2,3,7,8-TCDD								3.37
2,4,6-trichlorophenol	2,500	170,000	22,000	520	1,400	1,500		96,000
2-chlorophenol	24,000	65,000	800		1,500	LT	57,000	360,000
2,4-dichlorophenol	66,000	3,100,000	31,000	1700	760	4,500		370,000
2,4-dimethyphenol			500					72,000
4,6-dinitro-2-methylphenol								
pentachlorophenol		86,000	5,400	LT		11,000		100,000
phenol	24,000	55,000	45,000	4,400	3,200	100,000	98,000	88,000
2-methylphenol-4-methylphenol			LT		560	LT		330,000
2,4,5-trichlorophenol				LT				
acenaphthene			1,200	2,800				
1,2,4-trichlorobenzene				480			LT	100,000
1,2-dichlorobenzene	LT		LT			LT		20,000
1,4-dichlorobenzene			1,800	720	LT	760	LT	66,000
fluoranthene				1,200				LT
isophorone								
napthalene			11,000	8,300				LT
nitorbenzene		8,800	400					56,000
N-nitrosodiphenylamine								
bis(2-ethylhexyl)phthalate				LT				62,000
butyl benzyl phthalate								
di-n-butyl phthalate	LT							LT
di-n-octyl phthalate								
diethyl phthalate								
benzo(a)anthracene								
benzo(a)pyrene								
benzo(b)fluoranthene								
benzo(k)fluoranthene								
chrysene				400				
anthracene								
benzo(ghi)perylene								
fluorene			600	3,000				LT
phenanthrene			1,000	2,700				LT
dibenzo(a,h)anthracene								
indeno(1,2,3-cd)phrene								
pyrene			LT	LT				LT
aniline								
4-chloroaniline			LT					
dibenzofuran			1,000	3,000				
2-methylnapthalene			2,000	2,300				
3-nitroaniline			4,600					
benzene								
Chlorobenzene							10,000	40,000
1,2-dichloroethane								
1,1-dichloroethane								
1,1,2,2-tetrachloroethane								
1,2-trans-dichloroethene								
ethylbenzene								
methylene chloride			7.4	3.7	LM	8.0		
tetrachloroethene								
toluene								
trichloroethene								
acetone			960			977		LM
2-butanone								
4-methyl-2-pentanone						LT		
styrene								
O-xylene				2.0				5,100
PCB-1242								
PCB1254								
PCB-1248	1,000							
PCB-1260			485.2		69.6			
PCB-1016			2,120.6					
Total PCB							68,000	1,000,000

NOTE: All results in ppb.
LT = Present, but lower than the detection limit for low hazard analyses.
LM = Present, but lower than the detection limit for medium hazard analyses.
P= The sample could not be cleaned up sufficiently to yield TCDD results.
NA = Not analyzed, sample could not be cleaned up sufficiently.
Blank = not detected.

TABLE Q-4 (continued)

PARAMETERS	B5A 13.5-15.5	B5B 17.0-19.0	B6A 10.0-12.0	B6B 13.5-15.5	B7A 10.0-12.0	B7B 13.5-15.5	B8A 13.5-15.5	B8B 17.5-19.5
								BORING/SAMPLE NUMBER Depth (in feet)
2,3,7,8-TCDD								0.11
2,4,6-trichlorophenol	130,000	26,000	2,700	4,800	2,700		480,000	10,000
2-chlorophenol	31,000	8,400	1,600	1,600	LT			
2,4-dichlorophenol	560,000	260,000	17,000	15,000	6,100		1,500,000	64,000
2,4-dimethyphenol			2,000					
4,6-dinitro-2-methylphenol								
pentachlorophenol				16,000	25,000	31,000		
phenol	140,000	250,000	45,000	11,000	1,800			
2-methylphenol-			1,400	600				
4-methylphenol		36,000	7,000	1,400				
2,4,5-trichlorophenol								
acenaphthene								
1,2,4-trichlorobenzene	86,000	13,000					120,000	
1,2-dichlorobenzene	100,000	28,000	LT				180,000	
1,4-dichlorobenzene			3,100	800				
fluoranthene								
isophorene								
napthalene		LT	800	LT			380,000	LT
niterbenzene	27,000	11,000	LT				52,000	
N-nitrosodiphenylamine								
bis(2-ethylhexyl)phthalate								
butyl benzyl phthalate								
di-n-butyl phthalate			400	LT				
di-n-octyl phthalate								
diethyl phthalate								
benzo(a)anthracene								
benzo(a)pyrene						LT		
benzo(b)fluoranthene						LT		
benzo(k)fluoranthene						LT		
chrysene						LT		
anthracene								
benzo(ghi)perylene								
fluorene								
phenanthrene								
dibenzo(a,h)anthracene								
indeno(1,2,3-cd)pyrene								
pyrene								
aniline								
4-chloraniline			9,000					
dibenzofuran								
2-methylnapthalene								
3-nitroaniline								
benzene						3.2	LM	
Chlorobenzene	18,000	27,000	100,000	8.4		4.2	7,100	
1,2-dichloroethane			12,000	3.4				
1,1-dichloroethane								
1,1,2,2-tetrachloroethane								
1,2-trans-dichloroethane								
ethylbenzene			46,000	3.8		4.5		
methylene chloride				15.0	86.0	45.0	LT	
tetrachloroethene					LT			
toluene			50,000	LT		6.1		
trichloroethene						LT		
acetone				330	200	2,600		
2-butanone				LT	LT	LT		
4-methyl-2-pentanone								
styrene								
O-xylene			140,000	13.0	LT	22.0		
PCB-1242	70,000						1,700	2,700
PCB1254	68,000							
PCB-1248				4,700				
PCB-1260					590	13,000	880	1,500
PCB-1016					2,300	46,000		
Total PCB		66,000						

All results in ppb.
LT = Present, but lower than the detection limit for low hazard analyses.
LM = Present, but lower than the detection limit for medium hazard analyses.
P = The sample could not be cleaned up sufficiently to yield TCDD results.
NA = Not analyzed, sample could not be cleaned up sufficiently.
Blank = Not detected.

TABLE Q-4 (Continued)

BORING/SAMPLE NUMBER
DEPTH (in feet)

PARAMETERS	B9A 15.0-17.0	B9B 17.0-19.0	B10A 17.0-19.0	B10B 19.0-21.0	B11A 17.0-19.0	B11B 19.0-21.0	B12A 17.0-19.0	B12B 19.0-21.0
2,3,7,8-TCDD			P		P	P		
2,4,6-trichlorophenol	LT	600	48,000	640			4,400	9,400
2-chlorophenol	640	1,100	1,700	LT			1,200	520
2,4-dichlorophenol	7,400	9,800	170,000	9,60	3,200	20,000	8,800	4,200
2,4-dimethyphenol		LT						
4,6-dinitro-2-methylphenol								
pentachlorophenol		4,800		2,200			24,000	920
phenol	7,500	14,000	32,000	11,000	6,200	37,000	17,000	7,500
2-methylphenol-4-methylphenol	1,400	2,300	2,700				1,000	720
2,4,5-trichlorophenol								
acenaphthene								
1,2,4-trichlorobenzene			11,000					
1,2-dichlorobenzene			11,000		LT			800
1,4-dichlorobenzene		LT	27,000		LT			1,000
fluoranthene								
isophorone					17,000	LT		720
napthalene			6,500		72,000	35,000	LT	640
nitorbenzene								
N-nitrosodiphenylamine						LT	LT	
bis(2-ethylhexyl)phthalate	440				52,000	34,000	440	
butyl benzyl phthalate					LT			
di-n-butyl phthalate		1,500	LT		23,000	LT		
di-n-octyl phthalate								
diethyl phthalate	LT	840						
benzo(a)anthracene								
benzo(a)pyrene								
benzo(b)fluoranthene								1,000
benzo(k)fluoranthene								1,000
chrysene					6,400			
anthracene								
benzo(ghi)perylene								
fluorene								
phenanthrene					5,200			
dibenzo(a,h)anthracene								
indeno(1,2,3-cd)pyrene								
pyrene					5,600			
aniline								
4-chloraniline								LT
dibenzofuran								
2-methylnapthalene					10,000			
3-nitroaniline								
benzene			LM					
Chlorobenzene			5,200		LM			
1,2-dichloroethane								
1,1-dichloroethane								
1,1,2,2-tetrachloroethane								
1,2-trans-dichloroethane								
ethylbenzene			6,500		220,000			
methylene chloride	3.3	300	8,700	LT				
tetrachloroethene								
toluene			130,000		1,300,000	100,000		LM
trichloroethene					42,000			
acetone	210	14,000		4,400				
2-butanone								
4-methyl-2-pentanone							LT	
styrene								
O-xylene			30,000		650,000	70,000		LM
PCB-1242	600		NA					
PCB 1254			NA					
PCB-1248			NA		38,000	70,000		
PCB-1260	1,500	1,300	NA	120	45,000	681,000	7,000	5,000
PCB-1016								

All results in ppb.
LT = Present, but lower than the detection limit for low hazard analyses.
LM = Present, but lower than the detection limit for medium hazard analyses.
P = The sample could not be cleaned up sufficiently to yield TCDD results.
NA = Not analyzed, sample could not be cleaned up sufficiently.
Blank = Not detected.

TABLE Q-4 (Continued)

PARAMETERS	B13A 17.0-19.0	B13B 19.0-21.0	B14A 17.0-19.0	B14B 19.0-21.0	B15A 22.0-24.0	B15B 24.0-26.0	B16A 22.0-24.0	B17A 22.0-24.0
	BORING/SAMPLE NUMBER Depth (in feet)							
2,3,7,8-TCDD								
2,4,6-trichlorophenol	20,000	4,600			800	1,900	7,700	6,400
2-chlorophenol	2,500	3,800			600	1,600	4,600	100,000
2,4-dichlorophenol	9,400	11,000	460,000			11,000	27,000	120,000
2,4-dimethyphenol		LT					680	
4,6-dinitro-2-methylphenol	LT							
pentachlorophenol	12,000	44,000	16,000	16.000	4,200	12,000	39,000	26,000
phenol	8,900	15,000			6,000	13,000	16,000	30,000
2-methylphenol-								
4-methylphenol	920	1,400		16,000		1,000	1,900	9,200
2,4,5-trichlorophenol							LT	
acenaphthene								
1,2,4-trichlorobenzene	2,400	3,000	13,000,000	2,000,000				
1,2-dichlorobenzene			620,000	55,000			LT	
1,4-dichlorobenzene	1,300	2,000	1,200,000	100,000		1,600	4,100	
fluoranthene								
isophorone				14,000				
napthalene		LT	210,000	20,000		720	2,000	
niterbenzene								
N-nitrosodiphenylamine		400						
bis(2-ethylhexyl)phthalate			1,100,000	220,000			4,600	
butyl benzyl phthalate				LT		LT		
di-n-butyl phthalate		LT	900,000	49,000	LT	3,800		
di-n-octyl phthalate		LT						
diethyl phthalate						LT		
benzo(a)anthracene								
benzo(a)pyrene	LT							
benzo(b)fluoranthene	1,300*							
benzo(k)fluoranthene	1,300*							
chrysene								
anthracene								
benzo(ghi)perylene	880							
fluorene								
phenanthrene								
dibenzo(a,h)anthracene	LT							
indeno(1,2,3-cd)pyrene	LT							
pyrene								
aniline							680	
4-chloroaniline	LT	2,200					9,600	
dibenzofuran								
2-methylnapthalene				LT				
3-nitroaniline								
benzene			44,000					
Chlorobenzene			63,000	LM				
1,2-dichloroethane								
1,1-dichloroethane			19,000					
1,1,2,2-tetrachloroethane			5,700					
1,2-trans-dichloroethane			11,000					
ethylbenzene			790,000	330,000	LT			
methylene chloride	58.0	13.0	5,000		2.5	23.0		LM
tetrachloroethene			12,000					
toluene			2,400,000	540,000				
trichloroethene			55,000					
acetone	98.0	430			540	1,400		
2-butanone			LM					
4-methyl-2-pentanone		LT	250,000		LT			
styrene				64,000	4.2	5.3		
O-xylene			2,300,000	1,400,000		LT		
PCB-1242						5,000		
PCB1254								
PCB-1248								
PCB-1260	770	1,300	2,900,000	16,000,000	190	1,000	370	64.0
PCB-1016					210			
Total PCB								

All results in ppb.
LT = Present, but lower than the detection limit for low hazard analyses.
LM - Present, but lower than the detection limit for medium hazard analyses
P = The sample could not be cleaned up sufficiently to yield TCDD results.
NA = Not analyzed, sample could not be cleaned up sufficiently.
Blank = Not detected.

TABLE Q-4 (Continued)

PARAMETERS	B17B 24.0-26.0	B18A 22.0-24.0	B18B 24.0-26.0	Blank 1	Blank 2	Spike 01.0 ppb	Spike 01.0 ppb
							BORING/SAMPLE NUMBER Depth (in feet)
2,3,7,8-TCDD						0.37	0.91
2,4,6-trichlorophenol							
2-chlorophenol							
2,4-dichlorophenol	3,800						
2,4-dimethyphenol							
4,6-dinitro-2-methylphenol							
pentachlorophenol							
phenol							
2-methylphenol-							
4-methylphenol							
2,4,5-trichlorophenol							
acenaphthene							
1,2,4-trichlorobenzene							
1,2-dichlorobenzene							
1,4-dichlorobenzene	550		LT				
fluoranthene					1,000		
isophorone							
napthalene							
nitorbenzene							
N-nitrosodiphenylamine							
bis(2-ethylhexyl)phthalate	580	910	1,400	LT			
butyl benzyl phthalate							
di-n-butyl phthalate			LT				
di-n-octyl phthalate		LT					
diethyl phthalate							
benzo(a)anthracene		520			600		
benzo(a)pyrene					LT		
benzo(b)flu		LT			LT		
benzo(k)fluoranthene		LT			LT		
chrysene		640			560		
anthracene							
benzo(ghi)perylene							
fluorene							
phenanthrene					720		
dibenzo(a,h)anthracene							
indeno(1,2,3-cd)pyrene							
pyrene		LT			800		
aniline	51,000	1,700					
4-chloraniline		960					
dibenzofuran							
2-methylnapthalene							
3-nitroaniline							
benzene							
Chlorobenzene	4.1						
1,2-dichloroethane							
1,1-dichloroethane							
1,1,2,2-tetrachloroethane							
1,2-trans-dichloroethane							
ethylbenzene	7.7						
methylene chloride	6.1	19.0	47.0	LM	6.9		
tetrachloroethane							
toluene							
trichloroethane							
acetone	2,000		260				
2-butanone							
4-methyl-2-pentanone							
styrene							
O-xylene	23.0						
PCB-1242							
PCB1254							
PCB-1248							
PCB-1260	160		2,400		260		
PCB-1016							
Total PCB		670					

All results in ppb.
LT = Present, but lower than the detection limit for low hazard analyses.
LM = Present, but lower than the detection limit for medium hazard analyses.
P = The sample could ot be cleaned up sufficiently to yield TCDD results.
NA = Not analyzed, sample, could not be cleaned up sufficiently.
Blank = Not detected.

across the entire area investigated, which suggests that disposal of large quantities of chemical wastes occurred specifically in the northern portion of Site Q and probably over the entire site area.

Data Assessment and Recommendations

The data developed to date for Site Q shows significant overall contamination at the site. Leachate samples collected from the west-central portion of the site contained phenols, PCBs, and several metals. Data collected prior to 1980 show general degradation of water quality, as evidenced by the analysis of leachate and pond water samples. The cinders and flyash used as cover material over the entire site have been shown to contain elevated levels of heavy metals, and also to be highly permeable. The subsurface soil investigation conducted in 1983 indicated widespread organic contamination to a depth of 26 feet in the northern portion of Site Q. This study provides the only depth and area-specific information available for the site concerning chemical contamination. Since the 1983 study was limited to approximately 25 percent of the total site area, it is apparent that further investigation is necessary for Site Q.

Field activities presently scheduled at Site Q for the Dead Creek Project include the installation and sampling of seven monitoring wells and ambient air monitoring. This would provide limited information concerning overall site contamination, but would not be adequate to permit a detailed feasibility study of specific remedial options. Further field activities should include additional geophysical investigations and subsurface soil sampling for areas not covered in the 1983 investigation, plus infiltration tests, hydraulic conductivity tests, ground water monitoring, and an assessment of the ground water hydrology in relation to the river.

The proposed geophysical surveys should be conducted in both on- and off-site areas to delineate any off-site migration of contaminant plumes and other possible drum burial areas. Infiltration tests would be conducted at several locations to determine the adequacy of cover material, and to provide an estimate of leachate production. The ground and surface hydrology should be assessed over a period of time sufficient to address seasonal fluctuations. This assessment would provide data to determine ground water discharge and recharge in relation to the river. Additional investigation, if necessary, would be proposed following the completion of these activities.

SITE R - SAUGET TOXIC DUMP

Site Description

Site R is the Sauget Toxic Dump, an inactive industrial waste landfill used by the Monsanto Chemical Company between the years 1957 and 1977. Site R occupies approximately 36 acres adjacent to the Mississippi River in Sauget, Illinois. The site is located immediately west of Site Q, commonly known as the Sauget Landfill. Site R is presently covered with a clay cap and vegetated, and drainage is directed to ditches around the perimeter of the site. A Monsanto feedstock tank farm is located adjacent to the site on the northwest side.

Site History and Previous Investigation

Site R, also known as the Krummrich Landfill, was operated by Sauget and Company under contract with Monsanto. According to an Eckhardt Report summary sheet submitted in 1979 by Monsanto, approximately 262,500 tons of liquid and solid industrial wastes were disposed of at Site R from Monsanto plants in Sauget and St. Louis. In 1981, Monsanto submitted two Notification of Hazardous Waste Site Forms for Site R to the USEPA. The Monsanto W.G. Krummrich Plant (Sauget) listed 290,000 cubic yards (c.y.) of organics, inorganics, solvents, pesticides, and heavy metals as having been disposed at Site R. The Monsanto J. F. Queeny Plant (St. Louis) listed 6600 c.y. of the same waste types as above. Both notifications also indicated below-ground disposal of drums.

Monsanto has also submitted two reports to IEPA outling waste types and volumes disposed of at Site R for the years 1968 and 1972. Data compiled from these reports are summarized in Table R-1. This tabulation shows that the volume of wastes landfilled in 1972 was significantly lower than that in 1968 This reduction reflects the elimination of several major production operations at Monsanto's Krummrich Plant. By 1975, the majority of chemical waste disposal at

TABLE R-1: A LISTING OF WASTE TYPES AND APPROXIMATE QUANTITIES DEPOSITED AT SITE R AS REPORTED BY MONSANTO

	Approximate Annual Volume (Cubic Yards) 1968	1972
Still Residues		
From Distillation of:		
Nitroaniline and Similar Compounds	1700	94
Cresols, Esters of Phenol		1140
Chlorophenol, Chlorophenol Ether	1070	774
Aniline Derivatives	1300	208
Chlorobenzol	130	13
Nitro Benzene Derivatives	100	1190
Phenol	1020	
Aromatic Caboxylic Acids	1500	
Chlorinated Hydrocarbons		425
By Products		
Mixed Isomers of Nitrochlorobenzene	1700	785
Mixed Isomers of Dichlorophenol	3000	1240
Waste Maleic Anhydride	730	
Waste Chlorobenzenes and Nitrochlorobenzene	120	
Contaminated Acids and Caustic		
Waste Sulfuric Acid with Chloropenol Present	1500	1395
Waste Caustic Soda with Chlorophenol Present	5300	1760
Waste Solvents		
Waste Methanol Contaminated with Mercaptans	600	
Waste Isopropanol (Water and Chlorinated Hydrocarbon)	5500	
Miscellaneous Solvents	1019	
Oily Material	101	
Filter Sludges		
Spent Carbon or Other Filter Media	600	12
Lime Mud from Nitroaniline Production	1000	1195
Gypsum		5600
Obsolete Samples and Sampling Wastes		
Chlorophenols	72	40
Laboratory Samples	208	150
Total	28,270	16,021

NOTE: Blanks indicate waste type not reported.

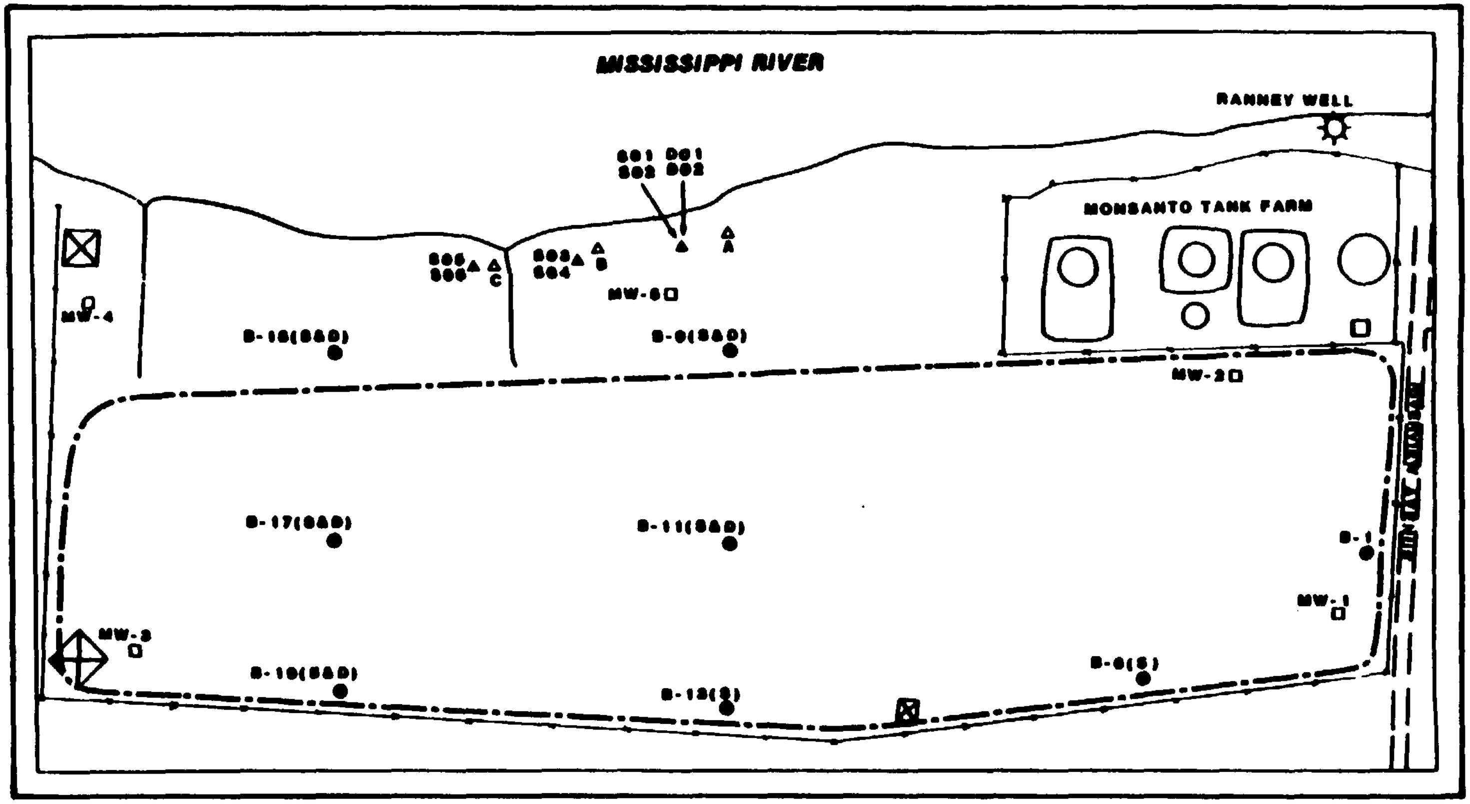
Site R had been terminated, as wastes were either hauled to other disposal facilities or incinerated on the plant site.

Very little information is available concerning disposal activities at Site R prior to 1967. In March, 1967, Sauget and Company filed an application for registration to operate a refuse disposal facility to the Illinois Department of Public Health. Health Department inspection reports from 1967 indicate disposal of liquid chemical wastes and metal containers from Monsanto. Liquids were pumped from tank trucks and drums into several pits around the site. Cinders were used as intermediate cover material.

In August, 1968, the Illinois Department of Public Health collected five ground water samples from on-site monitoring wells. The locations of these wells are shown in Figure R-1, and analytical results are presented in Table R-2. Phenols were detected in all wells at concentrations ranging from 15 to 1220 ppb. Alkalinity and total solids were also analyzed for, but no significant conclusions can be made from the data for these parameters.

IEPA began making routine inspections at Site R in 1971. Photographs of the site at this time suggest that wastes were disposed of in direct contact with the ground water. No segregation of liquid wastes was apparent in these photographs. IEPA collected another set of samples from the monitoring wells in December, 1972. Analytical data for these samples are shown in Table R-3. The results indicate concentrations of iron, zinc, and phenol above the State's water quality standards. Oil was also detected in wells MW-1 and MW-4. Samples were also collected from waste ponds at Site R by IEPA in January, 1973 and analyzed for phenol. Two samples were collected from pits identified as crystallization ponds, and one sample was taken from a spent caustic pond. Results for the waste pond samples are shown in Table R-4. High concentrations of phenols were detected in all samples.

In 1973, IEPA sent notices to Sauget and Company and Monsanto



LEGEND

A	IEPA LEACHATE & SEDIMENT SAMPLING LOCATION
S01	USEPA - FIT LEACHATE & SEDIMENT SAMPLING LOCATION
D01	DUPLICATE SAMPLE
MW-1	IEPA MONITORING WELL SAMPLING LOCATION (PRIOR TO 1979)
B-1	IEPA MONITORING WELL SAMPLING LOCATION (1979-1981)

FIGURE R-1
STATE AND USEPA SAMPLING LOCATIONS AT SITE R.

TABLE R-2: ANALYSIS OF GROUND WATER SAMPLES FROM SITE R (COLLECTED AUGUST 22, 1968 BY THE ILLINOIS DEPARTMENT OF PUBLIC HEALTH)

	SAMPLE LOCATIONS				
PARAMETERS	MW-1	MW-3	MW-4	MW-5	MW-6
Total Solids (conductivity mmhos)	320	300	280	250	500
Alkalinity (ppm)	172	148	156	124	248
Phenol (ppb)	1220	25	20	15	1200

TABLE R-3: ANALYSIS OF GROUND WATER SAMPLES FROM SITE R (COLLECTED DECEMBER 5, 1972 By IEPA)

PARAMETERS	SAMPLE LOCATIONS MW-1	MW-2	MW-3	MW-5
Calcium	50.2	147	36	49
Magnesium	15.8	36	18	18.5
Sodium	18.5	112	15	18.5
Potassium	3.6	6.7	4.2	3.5
Ammonia	1.5	2	0.65	0.92
Arsenic				
Boron	0.1	0.7	0.1	0.1
Cadmium				
Chromium (Total)				
Copper		0.1		
Iron	2.4	28.2	1.4	8.5
Lead				0. 02
Manganese	0.35	0.61	0.12	0.95
Mercury				
Nickel				
Zinc	0.40	1.42	0.21	2.05
Alkalinity	180	430	145	185
Chloride	22	225	22	22
Fluoride	0.2	0.2	0.2	2
Nitrate	0.1	0.3	0.1	0.1
Phosphate	0.003	0.21	0.05	0.34
Sulfate	16	12	29	32
Conductivity (mmhos)	445	1400	390	470
Phenols	0.088	0.2	0.007	0.014
Oil	1	0	1	0
Hardness	200	530	170	200
COD	46	135	3	8

NOTE: All results in ppm.
Blanks indicate below detection limits.

TABLE R-4: ANALYSIS OF SURFACE WATER SAMPLES FROM WASTE PONDS AT SITE R (COLLECTED JANUARY 18, 1973 BY IEPA)

	SAMPLE LOCATIONS		
PARAMETER	CRYSTALLIZATION POND 221	CRYSTALLIZATION POND 270	SPENT CAUSTIC POND
Phenol	2800	50,000	2,000

NOTE: Results in mg/l (ppm).

outlining violations of the Environmental Protection Act at Site R. Violations noted included inadequate segregation of wastes, open dumping of chemical wastes, and operation of a disposal facility without the necessary permits. In addition, it was noted that the cinders being used as cover material was not in accordance with the Rules and Regulations set forth by the Illinois Pollution Control Board. These violations were reiterated several times in 1973 and 1974.

The monitoring wells at Site R were sampled annually between the years 1973 and 1976. In addition to the monitoring wells on site, a Monsanto production well (Ranney Well), located in the northwest corner, was also sampled. Results from these sampling efforts are summarized in Tables R-5 through R-8. Although specific pumping data for the Ranney Well could not be located, Illinois State Water Survey reports and file information suggests that pumpage of the well produced a significant cone of influence in the area. Sample data shows significant contamination in the Ranney Well, most notably with phenols and PCBs. COD, which is a non-specific indicator of organic contaminants, was also detected at much higher concentrations in the Ranney Well than in other wells sampled. Iron, mercury, and zinc exceeded water quality standards on one or more occasion during this time period. It should be noted that analysis of samples collected at Site R prior to 1976 was limited to inorganic parameters and phenols. Ground water samples collected in February, 1976 were analyzed for PCBs (Table R-8). The Ranney well was the only well to show a detectable concentration of PCBs (7.7 ppb).

IEPA monthly inspection reports from 1975 indicate a significant reduction in the volume of chemical waste disposal at Site R. Wastes were being shipped to other locations for disposal or were being incinerated at Monsanto's Krummrich Plant. Monsanto voluntarily ceased disposal operations at the site in 1977 and began closure proceedings. D'Appolonia Consulting Engineers, Inc. (D'Appolonia) was contracted by Monsanto to conduct a subsurface investigation of the site. Twenty soil borings were drilled and eight monitoring

TABLE R-5: ANALYSIS OF GROUNDWATER SAMPLES FROM SITE R (COLLECTED FEBRUARY 22, 1973 BY IEPA)

PARAMETERS	SAMPLE LOCATIONS MW-1	MW-2	MW-4	MW-5	RANNEY WELL
Iron	6.8	11	0.8	6.6	1.9
Manganese	0.35	0.55	0.05	1.05	0.92
Mercury (ppb)	0.4			0.2	
Zinc	1.9	0.6		1.5	
Ammonia	1.6	2.6	0.7	1.3	0.98
Phenol (ppb)	150	80			7500
BOD	31	48	1	1	85
COD	51	78	16	13	220

NOTE: All results in ppm unless noted otherwise.
Blanks indicate below detection limits.

TABLE R-6: ANALYSIS OF GROUND WATER SAMPLES FROM SITE R (COLLECTED MAY 6, 1974 BY IEPA)

	SAMPLE LOCATIONS					
PARAMETERS	MW-1	MW-2	MW-3	MW-4	MW-5	Ranney Well
Arsenic	0.001	0.001	0.005		0.001	0.002
Barium	0.1	0.3	0.2	0.1	0.2	0.2
Boron	0.3	0.9	8.4	0.2	0.1	
Cadmium		0.02				
COD	44	990	21	14	17	340
Chloride	90	215	30	17	16	25
Cyanide		0.008				0.005
Iron	15	43.2	11.9	2.71	7.5	2.65
Lead	0.008	0.01		0.008	0.014	0.95
Manganese	0.69	1.4	1.1	0.2	0.9	0.95
Nitrate						0.4
Oil	4	7	1			5
Phenols	0.35	120	0.1	0.02	0.1	15
R.O.E.	720	1600	750	270	240	820
Selenium						
Sulfate	220	78	305	48	41	31

NOTE: All results in ppm.
Blanks indicate below detection limits.

TABLE R-7: ANALYSIS OF GROUND WATER SAMPLES FROM SITE R (COLLECTED OCTOBER 28, 1975 BY IEPA).

	SAMPLE LOCATIONS			
PARAMETERS	RANNEY WELL	MW-2	MW-4	MW-5
Ammonia				
Arsenic	0.002		0.002	
Barium	0.1	0.1	0.1	0.2
Boron	0.7	0.9	0.5	0.2
Cadmium				
COD	345	210	12	16
Chloride	110	200	23	20
Cyanide		0.02	0.01	
Iron	4.5	13.4	1.45	11
Lead	0.02		0.01	0.04
Manganese	1.3	0.2	0.1	0.7
Nitrate		0.3	0.2	0.1
Oil	3	6	2	3
Phenol	19	1.1	0.025	0.013
R.O.E.	300	920	230	200
Selenium	0.02			
Sulfate	95	6	22	15

NOTE: All results in mg/l, (ppm).
Blanks indicate not detected.

TABLE R-8: ANALYSIS OF GROUNDWATER SAMPLES FROM SITE R (COLLECTED FEBRUARY 17, 1976 BY IEPA)

	SAMPLE LOCATIONS					
PARAMETERS	MW-1	MW-2	MW-3	MW-4	MW-5	RANNEY WELL
Arsenic						0.001
Barium				0.2	0.3	0.1
Boron	0.3	0.8	8	0.5	0.1	1.4
Cadmium						
COD	28	130	8	16	15	390
Chloride	60	410	65	35	35	250
Cyanide	0.01	0.01	0.01	0.01	0.01	0.01
Iron	5.1	19.5	4.3	0.7	7.1	4.6
Lead	0.01	0.02			0.02	
Manganese	0.27	0.27	0.1	0.1	0.85	1.45
Nitrate	0.8	0.1				0.3
Phenols	0.03	0.01				
ROE	370	890	260	220	260	900
Selenium						
Sulfate	110	20	100	44	36	180
PCBs (ppb)						7.7

NOTE: All results in mg/l (ppm) unless noted otherwise.
Blanks indicate below detection limits.

wells were installed. The D'Appolonia study concluded that the landfill area consisted of 5 to 20 feet of flyash, cinders, silty clay, and unidentified waste. The landfill is underlain by alluvium, consisting of fine sands, silt, and clay ranging in thickness from 5 to 50 feet. Field permeability tests showed that alluvium is fairly permeable (1 x 10^{-3} cm/sec) suggesting that silty sand is the major component of the alluvium. This finding is supported by the evidence of vertical migration of contaminants to a depth of 65 feet, as suggested in the boring logs. Water levels were generally 25 to 30 feet below ground surface.

In May, 1978, Monsanto filed closure documents to IEPA detailing a closure plan for the site. In general, the plan consisted of specifications for the installation of a drainage system and clay cap, along with details for grading, seeding, and access restriction. The Helmkamp Construction Company was retained to implement the closure plan. An IEPA inspection report from October, 1979 indicated that closure operations at Site R were complete, including installation of a clay cap 3 to 6 feet in thickness. In February, 1980, Richard Sinise, an Environmental Control Engineer for Monsanto, filed an Affidavit of Closure for Site R.

IEPA personnel collected ground water samples from monitoring wells installed by D'Applonia in October, 1979 (Figure R-1). The samples were analyzed for inorganics and organic parameters reported by Monsanto to have been disposed of at the site. Analytical results for these samples are shown in Table R-9. Analysis showed the presence of several organic contaminants in the wells. Both shallow (25 to 35 feet) and deep (60 to 70 feet) wells were sampled, and chlorotoluene and phenol were found in all wells sampled. Well B-19S, located in the southeast portion of the site, also showed chlorophenol, dichlorobenzene, and diphenyl ether at concentrations ranging from 0.81 to 2.1 ppm. Iron, copper, and zinc exceeded water quality standards in several wells. Another set of samples was

TABLE R-9: ANALYSIS OF GROUNDWATER SAMPLES FROM SITE R (COLLECTED BY IEPA ON OCTOBER 12, 1979)

PARAMETERS	SAMPLE LOCATIONS					
	B-9S	B-9D	B-13D	B-15S	B-17S	B-19S
Inorganics						
Arsenic	0.01	0.004	0.002	0.002	0.002	0.007
Cadmium	0.02		0.01			0.01
Chromium	0.03		0.04			0.03
Copper	1.2	0.32	0.87	0.14	0.42	1.6
Iron	290	100	130	56	110	230
Lead	0.2		0.3		0.1	0.2
Magnesium	31	10	27	83	11	28
Manganese	7.8	1	1.4	1.8	0.99	2.8
Nickel	0.6	0.2	1.9	0.1	0.1	0.2
Zinc	3.3	0.36	3	0.4	0.52	0.87
Organics						
Aliphatic hydrocarbons				*	*	*
Chlorophenol	*	*				0.81
Chlorotoluene	70	40	10	0.34	11	18
Dichlorbenzene						1.6
Diphenylether					0.32	2.1
Phenol	21	56	10	14.3	41.5	22

NOTE: All results in ppm
Blanks indicate below detection limits
* Contaminants present, but not quantified

collected by the IEPA from the D'Appolonia monitoring wells in March, 1981. These samples were analyzed specifically for organic compounds. Analytical data for these samples are shown in Table R-10. Concentrations of organic contaminants were detected in all wells sampled. Chlorobenzene (130 to 3000 ppb) was detected in all wells, while biphenylamine, chlorophenol, dichlorobenzene, and dichlorophenol were seen in five or more wells.

In October, 1981, IEPA collected leachate and sediment samples at Site R from an area adjacent to the Mississippi River. Leachate and sediment samples were collected from three locations where leachate seeps were observed flowing from the landfill into the river. Analytical results for these samples are presented in Table R-11, and locations of the samples are shown in Figure R-1. The three water samples showed contamination with a wide variety of organic compounds. PCBs and chloroaniline were detected in all sediment samples. Other compounds detected in sediment samples included 2,4-dichlorophenoxy-acetic acid (2,4-D), chloronitrobenzene, dichloroaniline, chlorophenol, biphenyl-2-ol, and dichlorophenol. The presence of 2,4-D and chlorinated phenols in these samples suggested that dioxin was also a potential contaminant at the site. The IEPA subsequently requested assistance from USEPA in securing a laboratory to perform dioxin analysis on leachate samples from Site R. In November, 1981 a USEPA contractor (Ecology and Environment, Inc.) collected leachate and sediment samples at three locations adjacent to the river (Figure R-1). A total of eight samples plus three blanks were collected. Dioxin analysis was performed by the Brehm Laboratory at Wright State University. Monsanto obtained split samples and analyzed for chlorinated dibenzo-p-dioxins (CDDs), select organics, and metals. The USEPA samples were analyzed for tetra through octa CDDs and dibenzofurans (CDFs), select organics, and metals. Table R-12 provides an explanation and cross-reference for samples collected by USEPA and Monsanto.

Analytical results for CDDs and CDFs in the USEPA leachate samples

TABLE R-10: ORGANIC ANALYSIS OF GROUNDWATER SAMPLES FROM SITE R
(COLLECTED BY IEPA ON MARCH 25, 1981)

PARAMETERS	SAMPLE LOCATIONS								
	B-1	B-6S	B-9S	B9D	B11S	B-11D	B-15D	B-17D	B-19D
Aliphatic hydrocarbons					4,000				
Biphenylamine	1,800	250			15,000	1,100	1,300	860	660
Chlorobenzene	3,000	130	720	810	1,000	2,800	2,800	650	300
Chlorophenol	6,600	5,300	11,000	12,000	13,000	3,200	3,200		950
Chloronitrobenzene			2,500	1,500					
Dichlorobenzene	2,600				1,000	800	930	420	360
Dichlorophenol	1,100	700				630	2,900	670	
Trichlorophenol								1,200	

NOTE: All results in ug/l (ppb).
Blanks indicate below detection limit.

TABLE: R-11: ANALYSIS OF LEACHATE AND SEDIMENT SAMPLES FROM SITE R
(COLLECTED OCTOBER 2, 1981 BY IEPA)

PARAMETERS	SAMPLE A (WATER) D022687	SAMPLE B (WATER) D022688	SAMPLE C (WATER) D022689	SOIL SAMPLE A D022690	SOIL SAMPLE B D022692	SOIL SAMPLE C D022692
	SAMPLE LOCATIONS					
PCB			2.6	48	150	230
Toluene	11	40	150			
Chlorobenzene	160	390	1,600			
Chloroaniline	24,000	22,000	38,000	1,700	190	6,900
Chloronitrobenzene	21,000	9,600	820		130	
2.4-D	16,000	17,000	7,800	53	(<5)	(<5)
2,4,5-T				(<5)	(<5)	(<5)
Dichloronitrobenzene	740	590	790			
Dichloroaniline	870	820	2,800			190
Chloronitroaniline	84	33				
Nitroaniline	100	23				
Chlorophenol	15,000	30,000	27,000			290
Phenol	22,000	17,000	12,000			
Methylphenol	570	220	110			
Dichlorophenol	32,000	7,200	2,100	40		
Nitrophenol	600					
Biphenyldiol	1,700					
Aniline	550	120	35			
Methylbenzene	180	2,000	140			
Sucponamide						
4-methyl-2-pentanol	26					
2-methyl cyclopentanol	93					
Biphenyl 2-Ol	300	300	280			310
Benzenesulfonamide	76	630				
Dichlorobenzene		110	250			
Benzoic Acid/Derivatives	12,000	6,600	2,000			
Hydroxybenzoic Acid/ Derivatives	12,000					
2,4-D Isomer	38,000	48,000	29,000			
2,4,5-T Isomer	10,000	12,000	6,500			

NOTE: All results in ppb.
Blanks indicate below detection limits.
( ) indicates values are unconfirmed.

TABLE R-12: COMPILATION OF LEACHATE AND SEDIMENT SAMPLES COLLECTED AT SITE R IN NOVEMBER, 1981

STATION NUMBER	USEPA SAMPLE NUMBER[a]	MONSANTO SAMPLE NUMBER	DESCRIPTION
1	S01	M01	Leachate (5% Sediment)
1	D01		Duplicate for S01
1	S02	M02	Sediment
1	D02		Duplicate for S02
2	S03	M03	Leachate (10% Sediment)
2	S04	M04	Sediment
3	S05	M05	Leachate (10% Sediment
3	S06	M06	Sediment
Blank	S07		City of Chicago tap water. Blank for low level analysis.
Blank	R01		City of Chicago tap water. Blank for medium level analysis.
Blank	R01		City of Chicago tap water. Extra blank for low level analysis.

NOTE: Monsanto did not split samples where no number is listed.
a - Samples collected by Ecology and Environment, Inc.

are shown in Table R-13. Tetra- and penta-CDDs and CDFS were not detected in any of the samples. However, higher chlorinated dioxins and furans (hexa through octa isomers) were detected in three of the five samples submitted for analysis. Concentrations of these compounds ranged from 4.5 to 2693 parts per trillion (ppt). The two remaining samples, S07 and R01, were water blanks, and showed no detectable CDDs or CDFs. Monsanto also analyzed samples M01 through M05 for CDDs, and results showed no detectable concentrations of these compounds.

Inorganic data for the leachate and sediment samples from Site R are shown in Tables R-14 and R-15. In general, the leachate samples did not show significant inorganic contamination, although concentrations of chromium, copper, boron and iron exceeded water quality standards in two or more samples. Cyanide was detected in several samples, but was also found in the blank. Therefore, the results for cyanide should be considered unreliable. Data for the sediment samples show more substantial evidence of contamination. Elevated levels of arsenic, chromium, copper, lead, and barium were found in several samples. Identified organic compounds in leachate and sediment samples are listed in Table R-16. Phenol and chlorinated phenols were found in all but one sediment sample (M02) at concentrations ranging from 0.2 to 300 ppb. Leachate samples showed elevated levels of several organic parameters, including chlorinated phenols, chlorinated benzenes, chloroanilines, and 2,4-D. As shown in Table R-16, there is a significant discrepancy in the Monsanto and USEPA data for the sediment samples. The values listed by Monsanto were consistently and substantially higher than USEPA values. This may be explained by the fact that USEPA's samples were initially analyzed as medium hazard samples. Because of the higher detection limits associated with this analysis, no contaminants were initially found. USEPA subsequently decided to rerun the samples at lower detection limits. It is possible that the increased holding time and handling of these samples were instrumental in the reduction of concentrations of contaminants found.

Site R was assessed using USEPAs Hazard Ranking System (HRS) model in

TABLE R-13: ANALYSIS OF TETRA THROUGH OCTACHLORINATED DIBENZO-P-DIOXINS AND DIBENZOFURANS IN LEACHATE SAMPLES FROM SITE R (COLLECTED NOVEMBER 12, 1981 BY ECOLOGY AND ENVIRONMENT, INC.)

SAMPLE LOCATIONS	PARAMETERS									
	TCDDs	TCDFs	PCDDs	PCDFs	HXCDDs	HXCDFs	HPCDDs	HPCDFs	OCDDs	OCDFs
S01					4.5	6.3	86	74	323	30
S03					6.3	10	181	182	675	103
S05					5.8	6.3	152	112	2693	53
S07 (Blank)										
R01 (Blank)										

NOTE: All results in parts per trillion (ppb).
Blanks indicate below detection limits.
Analysis performed by Brehm Laboratory, Wright State University.

TABLE R-14: INORGANIC ANALYSIS OF LEACHATE SAMPLES FROM SITE R (COLLECTED NOVEMBER 12, 1981 BY ECOLOGY AND ENVIRONMENT, INC.)

	SAMPLE LOCATIONS							
PARAMETERS	S01	M01	D01	S03	M03	S05	M05	R01
Arsenic	0.034	0.02	0.031	0.016	0.025	0.029	0.065	
Mercury	0.0002		0.0002	0.0002	0.0014	0.0008	0.001	
Selenium	0.038		0.032	0.026		0.031		
Thallium								
Antimony								
Beryllium		0.008			0.005		0.008	
Cadmium		0.006			0.007		0.008	
Chromium	0.04	0.086	0.02	0.015	0.075	0.02	0.07	0.01
Copper		0.073			0.092		0.08	
Lead	0.005		0.008					
Nickel	0.04	0.155			0.124		0.144	
Silver						0.01		
Zinc	0.048	0.216	0.024	0.01	0.216	0.049	0.062	0.31
Aluminum		26.8			30.5		3.22	
Barium		0.5			0.5		0.36	
Boron	19.7	18	17.1	15.35	13.6	21.6	19.1	
Calcium	N/A	368	N/A	N/A	257	N/A	257	N/A
Cobalt		0.03			0.019		0.031	
Iron	0.06	25.5	0.06		30.8	0.63	27.4	
Magnesium	N/A	43.2	N/A	N/A	48.2	N/A	39.8	N/A
Manganese	0.02	6.27	0.32	1.99	2.1	5.4	8.82	0.03
Molybdenum	N/A	0.53	N/A	N/A	0.403	N/A	0.439	N/A
Phosphorus	N/A	0.9	N/A	N/A	0.907	N/A	2.06	N/A
Sodium	N/A	40.4	N/A	N/A	41.8	N/A	44.2	N/A
Tin						0.02	1.4	
Vanadium		0.18			0.138		0.17	
Cyanide	0.071	N/A	0.057	N/A	N/A	N/A	N/A	0.13

NOTE: All Results in ppm.
Blanks indicate below detection limits.
N/A - Parameter not analyzed.
R01 is a water blank.

TABLE R-15: INORGANIC ANALYSIS OF SEDIMENT SAMPLES FROM SITE R (COLLECTED NOVEMBER 12, 1981 BY ECOLOGY AND ENVIRONMENT, INC.)

	SAMPLE LOCATIONS						
PARAMETERS	S02	S03	M02	S04	M04	S06	M06
Arsenic	1.1	2.9	5.3	1.25	9.6	1.8	8.2
Mercury							
Selenium	1.1	1.8		1.5		1.6	
Thallium							
Antimony				4.0			
Beryllium			0.412		0.489		1.08
Cadmium			0.747	0.61	1.04		2.49
Chromium			10.7		10.4		28.7
Copper			7.17		7.89		25.5
Lead	2.4	2.9		2.45		1.7	
Nickel			17.4		18.6		33.8
Zinc	9.5	10	29.5	6.8	36.3	9.2	69.4
Aluminum	150	190	3870	155	4380	170	13,900
Barium			75.4		130	20	7.79
Boron		25	53	17	28.7	26	30.3
Calcium	N/A	N/A	3660	N/A	4010	N/A	6590
Cobalt			4.7		4.8		9.45
Iron	580	660	5870	425	8660	580	12,600
Magnesium	N/A	N/A	1780	N/A	2090	N/A	4080
Manganese	76	46	79.7	42	119	47	273
Molybdenum	N/A	N/A	10.6	N/A	12.5	N/A	22.4
Phosphorus	N/A	N/A	154	N/A	270	N/A	366
Sodium	N/A	N/A	1840	N/A	1270	N/A	4720
Tin							
Vanadium			14.4		17		43.9
Cyanide	28	13	N/A	6.8	N/A	90	N/A

NOTE: All results in ppm.
Blanks indicate below detection limit.
N/A - Parameter not analyzed.

TABLE R-16: IDENTIFIED ORGANIC COMPOUNDS IN LEACHATE AND SEDIMENT SAMPLES FROM SITE R (COLLECTED NOVEMBER 12, 1981 BY ECOLOGY AND ENVIRONMENT, INC.)

SAMPLE LOCATIONS

PARAMETERS	LEACHATE M01	LEACHATE M03	LEACHATE M05	SEDIMENT S02	SEDIMENT M02	SEDIMENT S04	SEDIMENT M04	SEDIMENT S06	SEDIMENT M06
2-Chlorophenol	340	100		0.26		0.2	200	0.4	
2,4-Dichlorophenol	100					0.42		0.56	
Phenol	130					0.5	300	0.42	300
2,4,6-Trichlorophenol								0.32	
1,4-Dichlorobenzene	30				200		400		600
1,2-Dichlorobenzene	20								
Bis(2 ethylhexyl) Phthalate					400		300		400
Chlorobenzene	160	30							
Aniline	60	40	25						
Chloroanilines	8000	4000	600						
Dichloroanilines	100	40							200
Chloronitrobenzenes	3000	80							
2,4-D	332	100							
PCBs			0.008		0.014		0.034		0.192

NOTE: All results in parts per billion (ppb).
Blanks indicate below detection limit.

July, 1982 by Ecology & Environment, Inc. The final migration score assigned to the site was 7.23, which included observed releases for both the ground water and surface water routes. Route scores for ground water and surface water were 6.12 and 10.91 respectively. The air route was assigned a zero score because an observed release had not been documented. The reason for the relatively low final score for Site R is the lack of a target population, which is a major factor in the HRS model. The source of potable water in the area is an intake in the Mississippi River, located approximately 2.5 miles upstream from the site. The upstream location of the intake excludes it from being used in the model.

In 1982, the Illinois Attorney General's office filed suit (Complaint Number 82-CH-185) against Monsanto outlining several apparent violations of the Illinois Environmental Protection Act. For the most part, the Complaint was directed at alleged water pollution caused by the defendant. Relief requested by the Attorney General included civil penalties and issuance of an injunction directing the defendant to immediately prevent seepage of wastes into the Mississippi River, and to remove all such wastes from the property. To date, no information has been located concerning a determination in this case. The Attorney General's office is presently engaged in an ongoing suit against Monsanto in an attempt to have all wastes removed from the site.

USEPA file information suggests that fish studies have been conducted in the Mississippi River in the vicinity of Site R. The Food and Drug Administration (FDA) in Edwardsville, Illinois has found unacceptable concentrations of PCBs in fish collected downstream of Site R. A detailed study was proposed for the area in the immediate vicinity of the site, however, attempts to obtain data from this study have been unsuccessful to date. It is not known if this study was to have included an assessment of the Sauget Treatment Plant effluent, which is discharged immediately northwest of Site R.

In 1982, USEPA developed a comparative analysis of chemicals detected in monitoring wells and leachate samples from Site R as they relate to wastes reported by Monsanto to have been disposed of at the site. Also included in the analysis were chemicals reported as being manufactured at Monsanto's Krummrich Plant, as documented in the 1977 chemical inventory developed as a result of the Toxic Substances Control Act (TSCA) and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The analysis revealed a high degree of association or correlation between chemicals detected in the sample, and those reported to have been disposed of or manufactured by Monsanto. A summary of data from this USEPA analysis report is presented in Table R-17.

In 1984, Monsanto contracted Geraghty and Miller, Inc. to perform a detailed hydrogeologic investigation in the Sauget area. Data from this study, which included the installation of approximately 60 monitoring wells, have not been made available.

Data Assessment and Recommendations

A great deal of data has been developed to date for Site R. Organic contaminants have been detected in both shallow and deep monitoring wells on site, as well as in leachate seeps leaving the site. Evidence of contamination has been observed to a depth of approximately 60 feet in soil borings. A substantial listing of the types and quantities of chemical wastes disposed of at the site was submitted to IEPA by Monsanto. In view of this information the only significant data gaps are: (1) specific delineation of contaminant boundaries, and (2) determination of the presence or absence of air emissions from the site. Because of the permeable nature of the subsurface soils and the characteristics of the wastes present at the site, it is likely that extensive migration of contaminants has occurred.

The present scope of work for the Dead Creek Project includes installation and sampling of monitoring wells at Site R. Ambient air monitoring will also be conducted to determine to what extent, if any, off-gassing of organic contaminants is occurring. Every effort

TABLE R-17: COMPARATIVE ANALYSIS OF CHEMICALS DETECTED IN SAMPLES AT SITE R AND THOSE REPORTED TO HAVE BEEN DISPOSED OR MANUFACTURED BY MONSANTO

COMPOUNDS	LEACHATE/SEDIMENT ANALYSIS			GROUNDWATER ANALYSIS	REPORTED DISPOSAL	MANUFACTURED
	TEPA	MONSANTO	USEPA	TEPA	MONSANTO	MONSANTO
PCBs	X	X				X
Chlorobenzene	X	X		X	X	X
Dichlorobenzene	X	X		X		X
Chloroaniline	X	X			X	X
Chloronitrobenzene	X	X		X	X	X
Dichloronitrobenzene	X					
Chlorophenol	X	X	X	X	X	X
Dichlorophenol	X	X	X	X	X	X
2,4-D/isomers	X	X				X
2,4,5,-T/isomers	X					X
Aniline	X	X				
Dichloroaniline	X				X	
Chloronitroaniline	X				X	X
Nitroaniline	X				X	X
Phenol	X	X	X	X	X	
Nitrophenol	X					
Methylphenol	X					
Diphenyldiol	X					
Benzoic Acid/Derivatives	X				X	X
4-methyl-2-pentanol	X				X	
2-methylcyclopentanol	X				X	
Benzene Sulfonamide	X				X	
Chlorotoluene	X					X
Dioxins/Dibenzofurans			X		X (By Product)	X (By Product)

should be made by th IEPA to obtain data on, and gain access to, the Monsanto wells installed by Geraghty and Miller. Access to these wells would likely eliminate the need for, or at least affect the location of, the monitoring wells to be installed during the field investigation of Site R. Pending the results of ground water sampling, a more specific approach to delineating the extent of contamination could be proposed. Samples should initially be collected from a minimum of 8 wells on Site R, and hydraulic conductivity tests should be run on a minimum of 2 deep and 2 shallow wells. Possibilities for identifying plume characteristics include conducting electromagenetic surveys (including off site areas), and soil gas monitoring. In any event, the lateral and vertical extent of contaminantion must be addressed prior to design of remedial options.

CREEK SECTOR B - DEAD CREEK

Site Description

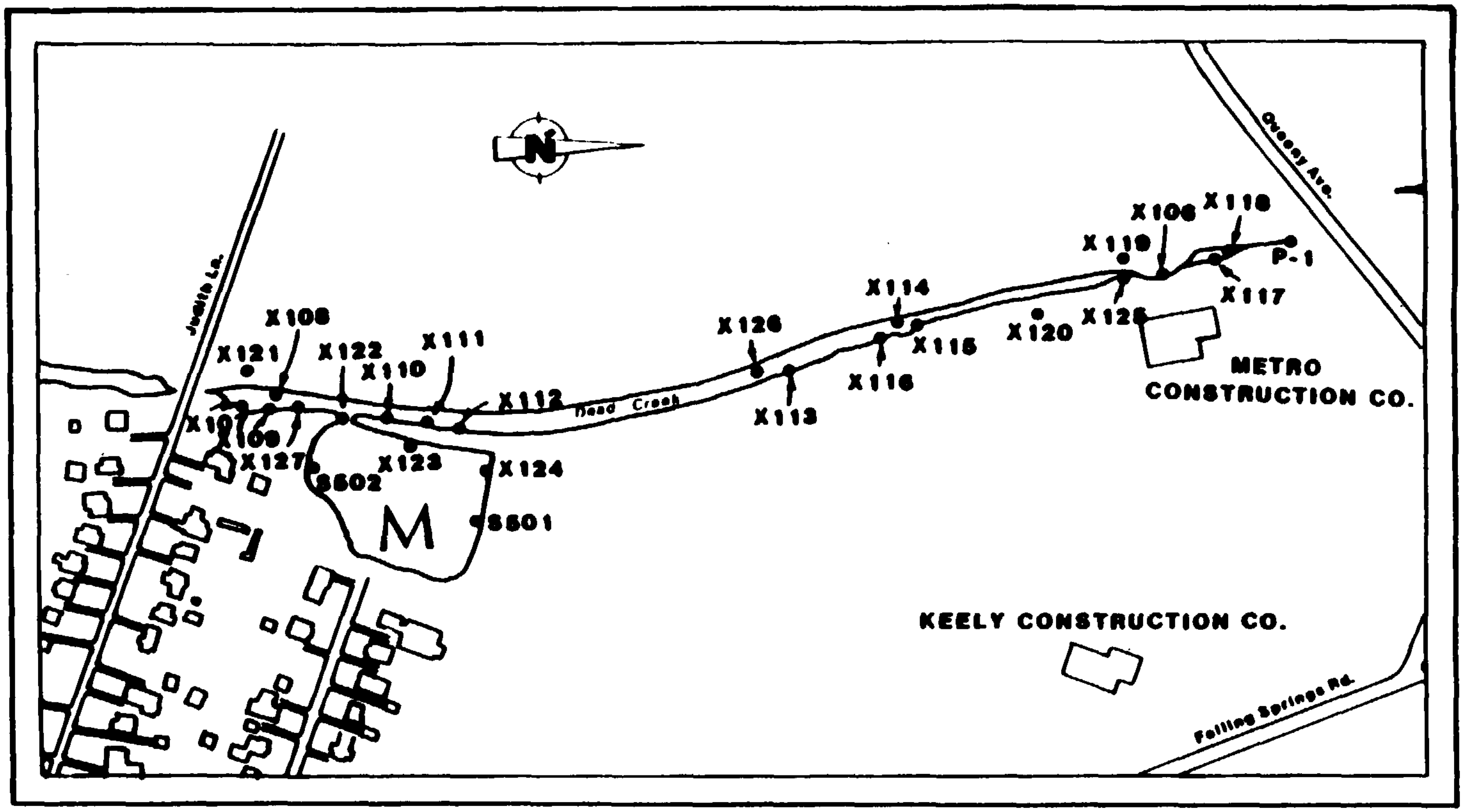
Creek Sector B (CS-B) includes the portion of Dead Creek lying between Queeny Avenue and Judith Lane in Sauget, Illinois. Three other sites in the Dead Creek Project are located adjacent to CS-B. These include Site G to the northwest, Site L to the northeast, and Site M to the southeast. All of these sites have been identified at one time or another as possible sources of pollution in CS-B. Presently, CS-B and Site M are enclosed by a chain link fence which was installed by the USEPA in 1982. The banks of the creek are heavily vegetated, and debris is scattered throughout the northern one-half of CS-B. Culverts at Queeny Avenue and Judith Lane have been blocked in order to prevent any release of contaminants to the remainder of the creek, although the adequacy of these blocks has been questioned several times. Water levels in the creek vary substantially depending on rainfall, and during extended periods of no precipitation, the creek becomes a dry ditch.

Site History and Previous Investigations

The IEPA initially became aware of environmental problems at CS-B in May, 1980 when several complaints were received concerning smouldering and fires observed the creek bed. In August, 1980, a local resident's dog died, apparently of chemical burns resulting from contact with materials in the ditch. Following this incident, the IEPA conducted preliminary sampling to determine the cause of these problems in CS-B. Chemical analysis of these samples indicated high levels of PCBs, phosphorus, and heavy metals, and the IEPA subsequently authorized the installation of fencing in order to prevent public access to the creek. In September 1980, the Illinois Department of Transportation (IDOT) completed installation of 7000 feet of snow fence with warning signs around CS-B and Site M. The IEPA subsequently performed a preliminary hydrogeological investigation in the area in an attempt to identify the sources of pollution in Dead Creek. The results of this investigation are documented in the St. John Report. The snow fence was later replaced with a chain link and barbed wire fence. The installation of this fence was authorized by the USEPA, and was completed in October, 1982.

Prior to the IEPA investigation in 1980, the City of Cahokia Health Department received complaints from area residents concerning discharges from Cerro Copper Product (Cerro) entering CS-B. In 1975, IEPA visited the site in order to determine if these discharges were occurring. Investigators observed discoloration in the creek and along the banks similar to what was later observed in the holding ponds at Cerro. One water sample was collected by IEPA from the creek immediately south of Queeny Avenue. Analysis of this sample indicated the presence of copper (0.3 ppm), iron (3.2 ppm), and mercury (0.1 ppb). The culvert under Queeny Avenue was sealed sometime in the early 1970's by Cerro Copper and the Monsanto Chemical Company for the purpose of restricting flow from the holding ponds at Cerro (Creek Sector A). The holding ponds were also regraded to the north to direct their flow to an interceptor discharging to the Sauget Wastewater Treatment Plant. The investigators concluded that flow through the blocked culvert had occurred, although the direction of flow could not be determined because no flow was evident at the time of the inspection.

The IEPA hydrogeological study, conducted in 1980, included collecting 20 surface sediment samples for analysis from CS-B (Figure B-1). Analyses of samples from the northern portion of CS-B are presented in Table B-1. Samples x106, x119, x120, x125, and x126 showed PCBs in concentrations ranging from 1.1 to 10,000 parts per million (ppm). Sample x125, taken adjacent to the former Waggoner Company operation, contained additional organic contaminants, including alkylbenzenes (370 ppm), dichlorobenzene (660 ppm), trichlorobenzene (78 ppm), dichlorophenol (170 ppm), and hydrocarbons (21,000 ppm). These contaminants were not detected in other surface sediment samples in the northern portion of CS-B during this



LEGEND

X106 SEDIMENT SAMPLING LOCATION

S502 SURFACE WATER SAMPLING LOCATION

P-1 SUBSURFACE SOIL SAMPLING LOCATION

SCALE

0 150 600 900 FEET

FIGURE B-1

IEPA SAMPLING LOCATIONS AT CREEK SECTOR B AND SITE M

TABLE B-1: ANALYSIS OF SOIL SAMPLES IN THE NORTHERN PORTION OF CREEK SECTOR B (COLLECTED BY IEPA 9-8-80 THROUGH 10-25-80)

PARAMETERS	SAMPLE LOCATIONS										
	x106	x113	x114	x115	x116	x117	x118	x119	x120	x125	x126
Aluminum		10,000	6,400	9,000	9,000	1,300	1,200				
Arsenic		300	23	18	9	16	15				
Barium		2,400	1,600	3,400	300	400	1,600	510	1,200	2,500	5,000
Beryllium		-	-	-	-	-	-	1	1	-	2
Boron		-	-	-	-	-	6	-	-	-	76
Cadmium		400	-	120	-	-	-	7	3	6	70
Calcium		11,000	14,000	11,000	5,000	1,600	6,000	7,300	72,000	6,900	19,000
Chromium		250	400	120	130	-	-	36	38	50	100
Cobalt		100	-	40	-	-	-	9	10	9	50
Copper		3,800	4,800	22,000	270	160	1,000	100	150	1,000	44,800
Iron		365,000	55,000	40,000	12,000	2,400	4,300	17,500	16,200	7,000	107,000
Lead		3,600	2,000	3,200	80	-	100	43	60	260	2,000
Magnesium		4,000	2,800	5,000	2,600	1,200	1,000	4,500	4,300	380	3,700
Manganese		120	130	150	60	40	50	260	350	45	280
Mercury		30	1.7	4	0.2	2	2				
Nickel		2,500	1,700	2,400	140	-	-	-	80	130	3,000
Phosphorus										2,000	8,900
Potassium		1,400	1,300	1,500	2,300	850	1,200	1,800	1,200	770	860
Silver			-	-	-	50	-	-	-	-	100
Sodium		2,800	700	1,100	360	150	180	110	225	80	1,400
Strontium		180	140	200	40	-	-	42	140	50	300
Vanadium		-	-	150	-	-	-	27	27	13	85
Zinc		61,000	20,000	71,000	2,500	-	300	2,000	700	1,500	62,000
PCBs	5,200							1.1	80	10,000	350
Alkylbenzenes	-							-	-	370	-
Dichlorobenzene	-							-	-	660	-
Dichlorophenol	-							-	-	170	-
Hydrocarbons	-							-	-	21,000	-
Naphthalenes	-							-	-	650	-
Trichlorobenzene	-							-	-	78	-

NOTE: All results in ppm
Blank indicate parameter not analyzed
\- Indicates below detection limits

investigation. In general, inorganic analysis of these samples indicated high levels of several metals in comparison with background conditions (Table B-3, sample x121).

Subsurface soil samples were also collected by IEPA from one location in the northern portion of CS-B during the 1980 investigation. Analyses of samples from boring P-1 are included in Table B-2. Results indicated the presence of PCBs to a depth of seven feet, and other organic contaminants to a depth of three feet. PCB concentrations ranged from 9,200 ppm near the surface to 53 ppm at depths greater than 4 feet and up to 7 feet. Other organic contaminants were detected at concentrations ranging from 12,000 ppm near the surface to 240 ppm at 2.5 feet. These results indicate non-uniform contaminant deposition in the northern portion of CS-B, which is common in riverine systems. The above data indicate that historical release(s) of contaminants to the northern portion of CS-B did occur. However, the horizontal and vertical extent of the resulting contamination has not been fully defined.

Analyses of sediment samples from the southern portion of CS-B are summarized in Table B-3. Sample x121 was taken from soil outside the creek bed to establish background conditions. Samples x107, x122, and x127 contained PCBs at concentrations ranging from 73 to 540 ppm. Sample x122 also showed diclorobenzene (0.35 ppm). This was the only organic contaminant other than PCBs detected in samples from the southern portion of CS-B. Several metals, including arsenic, cadmium, chromium, copper, lead, and zinc, were detected at levels significantly above background concentrations in all samples. However, the metal concentrations were comparable to concentrations detected in samples of sediment taken in the northern portion of CS-B. All of the samples were collected from the creek bed adjacent to, or downstream from Site M, which is an old sand pit excavated by the H.H. Hall Construction Company in approximately 1950. Hazardous materials were not reported to have been disposed of at Site M.

In October, 1980 IEPA and Monsanto Chemical Company cooperatively

TABLE B-2: ANALYSIS OF SUBSURFACE SOIL SAMPLES AT BORING LOCATION P-1 IN CREEK SECTOR B. (COLLECTED BY IEPA 9-8-80)

PARAMETERS	SAMPLE DEPTH						
	0'-1'	1'-2'	2'-3'	3'-4'	4'-5'	5'-6	6'-7'
Biphenyl	6,000	9,000	1,100				
Chloronitrobenzene	200	240					
Dichlorobenzene	12,000	8,900	240				
PCBs	9,200	2,600	92B-6	240	53	53	54
Trichlorobenzene	380	3,700	590				
Xylene	540	250					

NOTE: All results in ppm
Blanks indicate below detection limits

TABLE B-3: ANALYSIS OF SOIL SAMPLES IN THE SOUTHERN PORTION OF CREEK SECTOR B (COLLECTED BY IEPA 9-8-80 THROUGH 10-25-80)

PARAMETERS	SAMPLE LOCATIONS x107	x108	x109	x110	x111	x112	x121	x122	x127
Aluminum		8,000	9,100	7,000	8,000	6,600			
Arsenic	6,000	44	25	67	80	50			
Barium	4,800	3,800	1,600	4,300	1,800	8,000	230	5,500	2,500
Beryllium	-	-	-	-	-	-	-	2	2
Boron	-	-	-	-	-	-	-	-	-
Cadmium	70	-	200	40	100	100	1	35	50
Calcium	11,000	10,000	24,000	16,000	13,000	30,000	11,000	15,000	8,000
Chromium	360	300	-	140	50	50	-	50	340
Cobalt	30	30	20	-	-	30	9	15	30
Copper	32,000	31,000	7,700	22,000	15,000	41,000	100	21,900	28,000
Iron	70,000	58,000	75,000	67,000	68,000	52,000	16,500	50,000	63,000
Lead	24,000	2,000	1,700	2,000	2,000	5,100	-	1,700	1,700
Magnesium	2,900	3,900	3,600	4,100	4,000	4,000	5,900	3,800	2,700
Manganese	150	150	300	200	160	300	370	190	150
Mercury	-	1.7	3	3.3	3.2	6	-	-	-
Nickel	3,500	3,000	900	1,900	2,000	2,700	120	1,700	
Phosphorus	7,040	-	-	-	-	-	-	-	4,700
Potassium	1,200	1,500	1,700	1,300	1,600	1,200	1,500	960	1,000
Silver	40	-	-	-	-	-	-	30	40
Sodium	1,700	900	900	700	1,000	1,600	80	630	700
Strontium	180	200	130	160	160	430	32	190	130
Vanadium	60	-	-	70	100	-	25	45	45
Zinc	25,000	22,000	27,000	25,000	47,000	52,000	230	19,900	28,000
PCBs	120	-	-	-	-	-	-	540	73
Dichlorobenzene	-	-	-	-	-	-	-	0.35	-

NOTE: All results in ppm
Blanks indicate that parameter not analyzed
\- Indicates parameter is below detector limit

collected three sediment samples from CS-B in order to confirm results of earlier sampling done by IEPA. SD-1 was collected from the creek bed 40 yards-south of Queeny Avenue. This location is adjacent to the former Waggoner Company building and also near an old outfall (effluent pipe) from the Midwest Rubber Company. Samples SD-2 and SD-3 were collected approximately 220 yards south of SD-1, in the central portion of CS-B. Results of these samples, including a blank soil sample collected from the Missouri Bottoms in St. Charles, Mo., are presented in Tables B-4 and B-5. PCBs (45-13,000 ppm) were found in all three samples from CS-B, as were several chlorinated benzenes. Chlorinated phenols and phosphate ester were detected in samples SD-1 and SD-3, but were not found in SD-2. The analysis of these samples for inorganic parameters detected generally higher levels of inorganic parameters in SD-2 and SD-3 than those for SD-1 and the soil blank. These results clearly indicate differential contamination in CS-B, with SD-1 showing high levels of PCBs and other organic compounds, whereas SD-2 and SD-3 contained higher levels of metals.

IEPA personnel also collected two sediment samples from CS-B in December, 1982, as part of an area-wide dioxin sampling effort managed by the USEPA which also included Site O. The first sample was collected along the east bank of the creek, approximately 80 yards south of Queeny Avenue. Previous sampling conducted by IEPA in this area had shown high concentrations of PCBs. The second sample was collected along the west bank of the creek, approximately 50 yards south of Queeny Avenue. Both samples were analyzed specifically for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) by a USEPA contract laboratory. The first sample showed a quantified level (0.54 ppb) of TCDD, and the second sample was below the detection limit.

IEPAs Preliminary Hydrogeological Investigation of Dead Creek in 1980 was conducted for the purpose of determining possible sources of pollution observed in CS-B. The study included installation and

TABLE B-4: ORGANIC ANALYSIS OF SEDIMENT SAMPLES FROM DEAD CREEK, SECTOR B (SPLIT SAMPLES-IEPA AND MONSANTO COLLECTED 10-2-80)

	SAMPLE LOCATIONS			
PARAMETERS	SD-1	SD-2	SD-3	Blank*
CHLOROBENZENES:				
Monochlorobenzene	(0.9)		(0.3)	
p-Dichlorobenzene	370	(0.3)	(0.4)	
o-Dichlorobenzene	80	(0.6)	1	
Trichlorobenzenes	85	1.6	(0.7)	
Tetrachlorobenzenes	6.1	2.4	(0.4)	
Pentacesorobenzene				
Hexachlorobenzene		1.2		
Nitrochlorobenzenes	120			
CHLOROPHENOLS:				
o-Chlorophenol	3.7			
p-Chlorophenol	6.6		(0.9)	
2,4-Dichlorophenol	1.2			
Pentachlorophenol	130		1.8	
PHOSPHATE ESTERS:				
Dibutylphenyl Phosphate	330		(0.8)	
Butyldiphenyl Phosphate			(0.8)	
Triphenyl Phosphate	2600			
2-Ethylhexyldiphenyl Phosphate			2.2	
Isodecyldiphenyl Phosphate				
T-Butylphenyldiphenyl Phosphate	28			
Di-t-butylphenyldiphenyl Phosphate				
Nonylphenyl Diphenyl Phosphate				
Cumylphenyldiphenl Phosphate	3.7			
PCBs (Cl_2 to Cl_6 Homologs)	13,000	240	45	

NOTE: All values in ppm
*Soil blank collected from Missouri Bottoms, St. Charles, Mo.
Blanks indicate below detection limits
( ) Semi-quantitative values

TABLE B-5: INORGANIC ANALYSIS OF SEDIMENT SAMPLES FROM DEAD CREEK, SECTOR B (SPLIT SAMPLES - IEPA AND MONSANTO COLLECTED 10-2-80)

	SAMPLE LOCATIONS			
PARAMETERS	SD-1	SD-2	SD-3	Blank*
Aluminum	1,400	5,100	5,300	5,600
Antimony	13	240	160	29
Arsenic	210	40	55	5
Barium	770	1,200	1,300	130
Beryllium	-	-	-	-
Boron	28	160	100	27
Cadmium	5.1	60	55	3.9
Calcium	8,500	9,200	6,200	4,600
Chromium	25	110	240	19
Cobalt	15	180	120	33
Copper	460	28,000	18,000	19
Iron	4,700	53,000	30,000	9,900
Lead	180	2,000	1,600	50
Magnesium	460	2,200	2,000	2,300
Manganese	29	170	110	510
Molybdenum	6.1	92	68	11
Nickel	110	2,000	1,700	39
Phosphorus	2,500	13,000	9,400	610
Silicon	73	150	89	110
Silver	-	42	29	-
Sodium	400	540	410	320
Strontium	35	230	110	17
Tin	18	260	320	18
Titanium	32	110	80	37
Vanadium	34	140	130	130
Zinc	280	32,000	18,000	56

NOTE: All values in ppm
* Soil blank collected from Missouri Bottoms, St. Charles, MO.
\- Indicates below detection limits.

sampling of 12 monitoring wells in addition to the 1980 soil/sediment sampling described above. Residential wells were also sampled to determine ground water quality in the area. Locations of IEPA monitoring wells and residential well samples are shown in Figure B-2. All IEPA wells were screened in the Henry Formation sands, with screened interval elevations ranging between 366 and 402 feet Mean Sea Level. The hydraulic gradient in the vicinity of CS-B is very flat, with ground water flow generally to the west toward the Mississippi River.

Analytical data for three sets of samples from the IEPA monitoring wells, corresponding to three sampling events in 1980 and 1981, are presented in Tables B-6, B-7, and B-8. Well G108 can be considered a background well due to its location upgradient from the known disposal areas around CS-B. Organic contaminants were consistently found in Wells G107 and G112. These wells are in downgradient monitoring positions for sites G and I respectively. Certain organic contaminants were detected in Wells G102, G109 and G110 during the initial sample event, but these wells did not show any of the organics in subsequent samples. Well G102 is located immediately west of the northern portion of CS-B, and near the southeast corner of Site G. Well G109 is located approximately 150 feet west of the former Waggoner surface impoundment (Site L). Well G110 is located downgradient of Site H. PCBs were detected at one time or another in Wells G101, G102, G104, G106, G107, G110, and G112. Of these, only G101 and G102 showed PCBs in all three sets of samples.

Inorganic analyses of samples from the IEPA monitoring wells indicate several parameters at concentrations above background (G108) and water quality standards. Standards for iron, manganese, and phosphorus were exceeded in samples from the background well. Barium, cadmium and lead were detected at concentrations exceeding standards in one or more well(s). In general, wells G109, G110, and G112 showed the most significant inorganic contamination. When compared with data for other wells, G109 contained very high concentrations of arsenic, copper, nickel, and zinc. The pH for G109

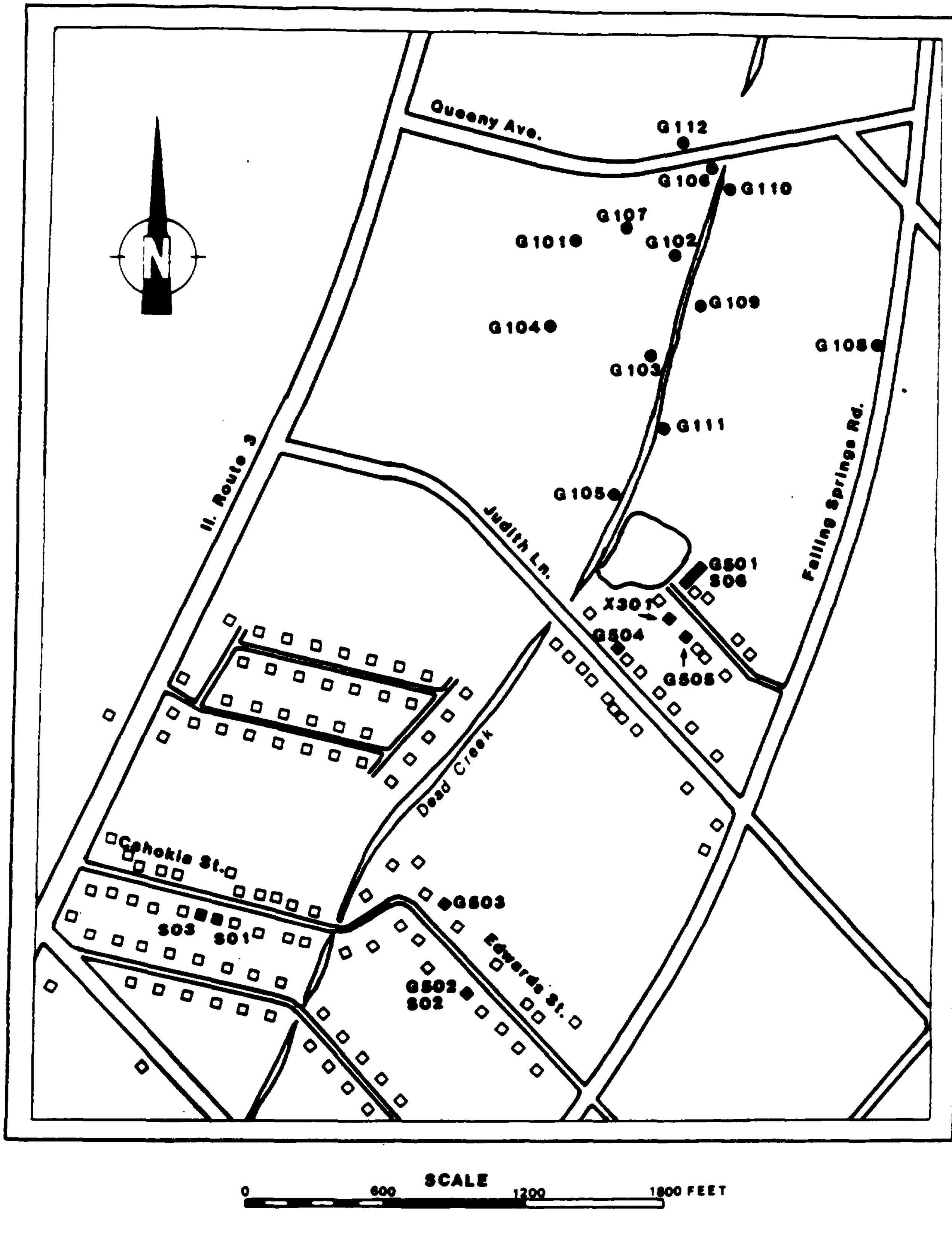


FIGURE B-2
LOCATIONS OF IEPA MONITORING WELLS AND RESIDENTIAL
WELLS SAMPLED IN THE VICINITY OF DEAD CREEK

TABLE 8-6: ANALYSIS OF GROUNDWATER SAMPLES FROM THE IEPA MONITORING WELLS
(COLLECTED 10-23-80)

PARAMETERS	SAMPLE LOCATIONS											
	G101	G102	G103	G104	G105	G106	G107	G108	G109	G110	G111	G112
Alkalinity	382	410	336	406	271	387	552	375	287	210	302	899
Ammonia	0.3	1.0	1.7	0.4	0.9	2.9	0.5	0.3	4.5	1.2	0.1	1.5
Arsenic	0.023	0.023	0.043	0.049	0.067	0.16	0.043	0.008	0.055	0.053	0.008	0.019
Barium	1.3	0.8	2.9	2.2	2.0	0.6	2.1	0.3	0.2	0.5	0.2	0.5
Boron	0.5	0.4	0.5	0.6	0.4	0.5	0.5	0.4	0.4	0.5	0.5	5.6
Cadmium	0.0	0.0	0.03	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.06
Calcium	180	210	210	210	340	185	500	140	380	500	110	242
BOD	237	160	244	206	473	115	1070	298	275	780	79	162
Chloride	48	103	58	52	65	109	132	79	69	61	32	363
Chromium (Total)	0.04	0.02	0.09	0.04	0.12	0.01	0.07	0.0	0.0	0.38	0.0	0.01
Chromium (+6)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Copper	0.46	0.13	1.1	0.31	0.73	0.44	0.68	0.04	0.13	2.3	0.04	1.2
Cyanide												0.0
Fluoride	0.4	0.7	0.7	0.3	1.0	0.7	0.7	0.3	1.2	0.8	0.3	0.5
Hardness	501	884	549	630	528	637	777	496	1664	279	419	1080
Iron	51.0	30.5	86	90	18	62	13	4.1	39.0	340	5	18
Lead	0.10	0.15	0.26	0.2	0.31	0.0	0.27	0.0	0.0	7.3	0.07	0.44
Magnesium	0.09	90	79	72	100	49	205	24	100	209	24	82.5
Manganese	5.1	3.8	4.2	3.4	4.2	1.9	9.8	0.98	4.5	8.0	1.1	3.9
Mercury	0.0	0.0	0.0002	0.0	0.0	0.0	0.0	0.0001	0.0	0.0	0.0	0.0001
Nickel	0.1	0.1	0.9	0.1	0.8	0.1	0.3	0.0	0.5	1.9	0.0	0.3
Nitrate-Nitrite	0.1	0.1	0.1	0.4	0.0	0.1	0.1	1.1	0.0	0.4	0.5	0.0
pH	6.6	6.6	6.5	6.6	6.6	6.5	6.4	6.6	6.3	6.7	7.0	6.4
Phenolics	0.0	.01	0.0	0.005	0.0	0.065	2.5	0.01	0.45	0.015	0.0	0.875
Phosphorus	2.9	1.2	3.3	2.7	6.0	1.8	9.4	.18	.72	16	.24	.69
Potassium	10.6	13.1	13.4	12.3	22	7.7	15.2	13.7	14.9	29	4.9	58
R.O.E.	650	1230	765	790	824	1020	1230	704	2460	508	512	2130
Selenium	0.003	0.001	0.004	0.01	0.008	0.001	0.004	0.001	0.001	0.005	0.002	0.001
Silver	0.01	0.0	0.2	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.02	0.11
Sodium	24	60	40	29	57	96		40	40	53	24	260
S.C.	870	1500	1050	1080	1040	1340	1430	960	2470	720	490	
Sulfate	132	434	230	204	296	281	201	103	1348	93	104	518
Z	0.6	0.4	6.2	0.3	3.7	0.1	0.8	0.0	0.1	8.0	0.0	7.8
PCB (ppb)	1.0	1.2	-	-	-	-	-	-	-	2.7	-	-
Chlorophenol (ppb)	-	1200	-	-	-	-	630	-	19	-	-	-
Chlorobenzene (ppb)	-	-	-	-	-	-	19	-	-	-	-	100
Dichlorobenzene (ppb)	-	-	-	-	-	-	25	-	-	-	-	65
Dichlorophenol (ppb)	-	-	-	-	-	-	890	-	-	-	-	-
Cyclohexanone (ppb)	-	-	-	-	-	-	-	-	120	5.9	-	-
Chloroaniline (ppb)	-	-	-	-	-	-	-	-	-	-	-	3500

NOTE: All results in ppm unless otherwise noted.
Blanks indicate parameter not analyzed.
- indicates below detection limits.

TABLE B-7: ANALYSIS OF GROUNDWATER SAMPLES FROM THE IEPA MONITORING WELLS
(COLLECTED 1-28-81)

PARAMETERS	SAMPLE LOCATIONS G101	G102	G103	G104	G105	G106	G107	G108	G109	G110	G111	G112
Alkalinity	447	421	266	520	363	556	621	448	18	308	394	619
Ammonia	0.3	0.0	1.4	0.2	0.7	3.3	1.0	0.0	17	0.2	0.1	0.5
Arsenic	0.015	0.016	0.018	0.002	0.037	0.11	0.021	0.004	7.5	0.013	0.014	0.027
Barium	0.9	1.2	0.9	0.3	1.8	1.0	3.2	0.5	0.2	1.0	0.7	0.5
Boron	0.3	0.4	0.4	0.7	0.4	0.5	0.5	0.2	0.8	0.2	0.6	0.9
Cadmium	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00
Calcium	220.0	328.9	176.3	218.0	319.2	225.5	1169.5	205.5	466.7	169.4	181.4	198.3
C.O.D.	45	93	56	9	143	212	635	8	1315	37	28	47
Chloride	20	128	64	29	59	156	201	76	32	36	18	210
Chromium (Total)	0.02	0.02	0.02	0.00	0.03	0.00	0.09	0.00	0.04	0.02	0.02	0.00
Copper	0.59	0.79	0.36	0.14	0.43	0.29	0.97	0.00	94.1	0.11	0.04	0.28
Cyanide	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Hardness	554	1072	490	717	764	617	960	564	2144	447	530	486
Iron	30.4	16.5	20.8	1.4	60.8	67.5	172	0.3	198	19.1	10.1	18.9
Lead	0.17	0.08	0.00	0.00	0.07	0.00	0.32	0.00	0.00	0.00	0.00	0.00
Magnesium	48.2	78.0	46.3	49.1	73.6	49.1	288.1	34.3	184.4	43.5	37.9	54.0
Manganese	3.02	3.15	3.07	1.41	4.10	2.13	9.64	0.34	8.30	0.77	1.76	2.78
Mercury	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0004	0.0	0.0	0.0
Nickel	0.1	0.1	0.4	0.0	0.2	0.0	0.5	0.0	176	0.9	0.0	0.0
Nitrate-Nitrite	0.0	2.5	0.1	0.5	0.0	0.0	0.2	3.5	0.3	18	0.5	0.0
pH	7.0	7.0	7.1	7.2	7.0	6.9	6.9	7.1	4.1	6.9	7.0	6.9
Phenolics	0.0	0.0	0.0	0.0	0.0	1.46	0.5	0.01	1.86	0.02	0.015	0.05
Phosphorus	0.91	0.88	0.41	0.06	3.6	2.1	10	0.03	3.7	1.0	0.51	0.53
Potassium	6.4	12	8.8	6.0	13	6.2	20	16	18	7.5	4.2	20
Selenium	0.002	0.002	0.002	0.002	0.003	0.002	0.011	0.004	0.006	0.016	0.002	0.0
Silver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sodium	13	63	48	15	50	94	60	30	37	13	14	18
Sulfate	129	583	256	265	468	143	276	86	3371	57	153	212
Zinc	0.3	1.2	1.8	0.1	1.5	0.1	1.5	0.0	10.1	2.0	0.1	2.8
PCB (ppb)	0.22	3.9	-	0.3	-	-	0.4	-	-	-	-	-
Chlorobenzene (ppb)							6.3	-	-			2.5
Dichlorophenol (ppb)							560	-	-			-
Chloroaniline (ppb)							90	-	-			2.1

NOTE: All results in ppm unless otherwise noted.
Blanks indicate parameter not analyzed.
\- indicates below detection limits.

TABLE B-8: ANALYSIS OF GROUNDWATER SAMPLES FROM THE IEPA MONITORING WELLS
(COLLECTED 3-10-81 - 3-11-81)

PARAMETERS	SAMPLE LOCATIONS											
	G101	G102	G103	G104	G105	G106	G107	G108	G109	G110	G111	G112
Alkalinity	483	484	319	568	393	594	657	464	58	331	387	400
Ammonia	0.2	0.0	1.5	0.0	0.4	3.0	0.2	0.0	15	0.0	0.1	0.7
Arsenic	0.001	0.0	0.003	0.001	0.013	0.085	0.004	0.001	3.9	0.001	0.001	0.00
Barium	0.0	0.7	0.1	0.2	0.2	0.3	0.1	0.2	0.1	0.1	0.1	0.0
Boron	0.2	0.4	0.3	0.7	0.3	0.5	0.5	0.2	0.5	0.1	0.4	3.4
Cadmium	0.0	0.01	0.01	0.0	0.0	0.0	0.01	0.0	0.07	1.1	0.0	0.17
Calcium	154	333	161	205	218	175	186	148	431	121	164	207
BOD	10	24	47	9	23	146	47	12	930	10	9	52
Chloride	16	124	46	28	57	150	235	51	24	27	16	133
Chromium (Total)	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0
Copper	0.04	0.06	0.08	0.02	0.02	0.01	0.01	0.03	67	0.02	0.07	0.48
Cyanide	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hardness	542	1062	620	839	796	675	1096	479	1651	424	485	789
Iron	0.3	0.3	1.6	0.0	9.4	4.9	2.4	0.0	1.4	0.0	0.2	0.5
Lead	0.0	0.0	0.0	0.0	0.0	0.06	0.0	0.0	0.0	0.0	0.07	0.0
Magnesium	34.2	77.9	41.9	56.8	47	44.8	44.8	22.3	138	28.7	31.8	72
Manganese	2.0	2.98	3.51	0.61	2.32	1.62	2.12	0.23	6.22	0.14	1.02	2.1
Mercury	-	-	-	-	-	-	0.0002	-	0.0003	-	-	-
Nickel	0.0	0.3	1.1	0.0	0.2	0.0	0.0	0.1	123	1.2	0.0	0.4
Nitrate-Nitrite	0.0	1.1	0.0	2.3	0.0	0.0	0.0	0.3	0.3	15	2.7	0.2
pH	6.9	6.8	6.8	6.9	6.8	6.7	6.7	7.0	4.6	6.6	6.8	6.6
Phenolics	0.0	0.0	0.005	0.0	0.0	0.0	1.7	0.1	1.4	0.0	0.0	0.00
Phosphorus	0.0	0.08	0.03	0.02	0.1	1.5	0.03	0.02	2.2	0.01	0.01	0.03
Potassium	4.0	10.8	10.4	5.9	8.9	5.7	2.8	18.2	6.4	6.3	2.9	40.2
Selenium	0.0	0.0	0.001	0.003	0.0	0.0	0.0	0.001	0.003	0.018	0.001	0.0
Silver	0.01	0.02	0.0	0.0	0.02	0.01	0.01	0.0	0.0	0.01	0.01	0.01
Sodium	11	64	65.6	17.4	51.2	92.6	39.2	25.2	12.1	14.2	15.5	96.6
Sulfate	118	617	471	303	466	146	313	55	2629	61	147	544
Zinc	0.1	0.8	2.8	0.1	0.3	0.1	0.1	0.3	6.3	1.8	0.1	11.8
PCB (ppb)	0.13	0.46	-	0.1	-	2.4	0.37	-	-	0.9	-	2.0

NOTE: All results in ppm unless otherwise noted.
Blanks indicate parameter not analyzed.
- indictes below detection limits.

was 6.3, 4.1, and 4.6 during the three sampling events. This indicates an unidentified source was releasing acid to the groundwater. Other wells which exhibited significant inorganic contamination include G102, G103, G105, and G106, all of which are located adjacent to CS-B along the west side. The data indicates non-uniform ground water contamination in the area, likely resulting from a variety of pollutional sources.

Private wells in the area have been periodically sampled by the IEPA and the USEPA. These wells are no longer used for potable water, but they are used for watering lawns and gardens. Locations of private well samples in the Dead Creek area are shown in Figure B-2. IEPA sampled five residential wells and collected one basement seepage sample near Creek Sectors B and C. Analytical data for these samples are presented in Table B-9. G504, located east of CS-B on Judith Lane, exceeded the standard for copper. The wells all showed water quality similar to that found in IEPA monitoring well G108, indicative of background conditions in the area. The basement seepage sample was collected from a residence on Walnut Street, just east of Site M. Analysis of this sample indicated higher levels of barium and copper, when compared with the private well samples. The seepage sample (x301) also showed a measurable level of chlordane, which was likely due to the application of commercial pesticides.

In March, 1982 the USEPA collected ground water samples from four private wells (S01, S02, S03, and S06) and two IEPA monitoring wells (S04 and S05). Ground water samples S04 and S05 correspond to IEPA monitoring wells G102 and G101 respectively. In addition, soil samples (S07 S10, S11) were collected from three gardens where well water is used for watering. Soil Samples S07, S010, and S011 were collected from gardens at the locations of ground water samples S01, S02, and S03 respectively (see Figure B-2 for approximate sample locations). Water and soil blank samples, R09 and R12 respectively, were also collected and analyzed. Analytical data for these samples are presented in Tables B-10 and B-11.

TABLE B-9: ANALYSIS OF RESIDENTIAL WELL AND SEEPAGE SAMPLES COLLECTED BY IEPA

	SAMPLE DATES AND LOCATIONS					
PARAMETERS	9/16/80 G501	9/16/80 G502	9/16/80 G503	9/23/80 G504	6/8/83 G505	1/5/83 x301
Arsenic	0.008	0.004	0.001		0.01	0.0[illegible]7
Barium	0.2	0.16	0.39	0.05	0.4	1.1
Boron	0.28	0.27	0.25	0.58	0.4	0.3
Cadmium						
Chromium						
Copper	0.02			0.06	0.01	0.03
Iron	4.6	19	17.7	0.73	26	31
Lead						0.0[illegible]
Magnesium	33	39	36	30	35.3	54
Manganese	1.02	1.26	0.79	0.65	1.3	1.49
Mercury				0.0001		
Nickel				0.02		0.1
Phosphorus				0.02	0.62	1.2
Potassium	6.6	5.7	4.5	6	6.2	6.4
Silver						
Sodium	21	24	12	26	15.2	19
Zinc	0.85		0.18	0.8		0.7
PCBs	-	-	-			
Chlordane (ppb)	-	-	-	-		0.13

NOTE: All results in ppm unless otherwise noted
Blanks indicate below detection limit
- Indicates parameter not analyzed
Sample x301 was collected from basement seepage

TABLE B-10: ANALYSIS OF IDENTIFIED ORGANICS IN GROUND WATER AND SOIL SAMPLES IN THE VICINITY OF CREEK SECTOR B (COLLECTED BY USEPA 3-3-82)

	SAMPLE LOCATION										
	Ground Water							Soil			
PARAMETERS	S01	S02	S03	S04	S05	S06	R09	S07	S010	S011	R012
bis(2-ethylhexyl) phthalate	64	62			19	a				a	0.44
di-n-butyl phthalate	a	a	a	a	11	a				a	a
diethyl phthalate	a	a	a	a			a				
3,4 benzofluoranthene	a										
benzo(k) fluoranthene	a										
butyl benzylphthalate				a			a				
methylene chloride	16	16	2300	3100	990	2000	19	1	0.1		0.75
1,2-dichlorobenzene				a							
1,4-dichlorobenzene				a							
chlorobenzene				a	a						
heptachlor				0.11b	0.146						
beta-BHC				0.18b	0.3b	4.04b					
gamma-BHC				0.16b	0.25b						
alpha-BHC					0.18b	0.25b					
aldrin				0.17b							
dieldrin								0.012		0.0046	
chlordane									0.11b		
heptachlorepoxide						1.46b					
delta-BHC						0.95b					
fluoranthene							a			a	
benzo(a) anthracene							a			a	
anthracene							a				
pyrene							a			a	
Chrysene										a	0.02b

NOTE: All results in ppb
Blanks indicate below detection limit
a - Compound detected at value below specified contract detection limit (compound identified as present, but not quantified)
b- value not confirmed by GCMS
Samples R09 and R012 are water and soil blanks, respectively

TABLE 8-11: INORGANIC ANALYSIS OF GROUND WATER AND SOIL SAMPLES IN THE VICINITY OF CREEK SECTOR 8 (COLLECTED BY USEPA 3-3-82)

SAMPLE LOCATIONS

PARAMETERS	GROUND WATER - in PPB						SOIL IN PPM			
	S01	S02	S03	S04	S05	S06	S07	S010	S011	R012
Aluminum		400	390		940	1,200	750	600	430	
Antimony										
Arsenic	11			29			1.3	1.0		
Barium							80	80	80	
Beryllium										
Boron	10,500	11,000	8,000	1,800	140	110				
Cadmium	4.2	14	31	5.3		2.8	1.06	1.64	0.29	
Chromium	12						2.2			3.2
Cobalt	62	70	82	95						
Copper	65						16	24	13	
Iron	65,000	31,000	38,000	28,000	530	250	340	360	240	
Lead	570	97	74	9	11	10	(45)	(20)	(25)	
Manganese	1,600	1,100	1,500	5,100	460	80	120	630	134	
Mercury										
Mercury*	0.1	0.4	0.4	0.2	0.1					
Nickel							6.5	5.5	4	
Selenium										
Silver										
Thallium										
Tin									2	
Vanadium										
Zinc	107,000	109.000	40,000	1,900	260	350	96	77	130	

NOTE: Blanks indicate below detection limits
( ) - Results did not meet USEPA Quality Control criteria - Data unreliable
* Duplicate analysis performed by USEPA central regional laboratory
Samples R09 and R012 are water and soil blanks, respectively

Quantified levels of bis-(2-ethylhexyl) phthalate were found in wells S01, S02, and S05. In addition, seven compounds from the pesticide fraction were detected in Wells S04, S05 (IEPA wells), and S06. Diethyl phthalate, butyl benzylphthalate, and methylene chloride were detected in the water blank, indicating that values of these parameters found in other samples should be disregarded. Methylene chloride was used to decontaminate sampling equipment, and concentrations of this parameter in all samples should not be considered indicative of aquifer conditions. Water quality standards for lead and cadmium were exceeded in one or more wells.

The soil samples showed trace levels of chlordane and dieldrin. It could not be determined if levels of pesticides found in the gardens soils were attributable to the use of well water or application of commercial pesticide products to the gardens. Phthalates, methylene chloride, chrysene, and chromium were detected in the soil blank (R012), and these compounds should be disregarded in other samples.

In September and October, 1980 IEPA conducted preliminary air monitoring in CS-B. The survey included use of detector tubes (Drager) for halogenated hydrocarbons, and collection of air samples in charcoal tubes with subsequent laboratory analysis. The detector tubes showed positive readings for hydrocarbons in the northern portion of CS-B, adjacent to the former Waggoner Building. Results were not quantified, and negative readings were observed in all other areas surveyed. Air samples were collected from two locations in CS-B using charcoal tubes and sampling pumps. Two samples were collected from each location in order to monitor conditions for undisturbed and disturbed soil. Samples from the first location, 40 yards south of Queeny Avenue, showed no positive readings for volatile organic compounds (VOCs) for disturbed or undisturbed soil conditions. Xylene was detected for disturbed and undisturbed soil conditions at the second sampling location, which was 60 yards north of Judith Lane, adjacent to Site M. All samples were extracted and analyzed at IEPAs Springfield Laboratory.

A USEPA Field Investigation Team (FIT) contractor also performed an air monitoring survey in the creek bed in March, 1982. This survey involved the use of an organic vapor analyzer (OVA), an HNU photoionizer, and Drager detector tubes for phosgene gas. Results indicated that a small, but measurable, concentration of organic vapors were present in the breathing zone (5 feet above ground surface), with concentrations increasing closer to the creek bed. In the breathing zone, the OVA showed readings up to 0.5 ppm above background, and the HNU readings were as high as 9 ppm above background. The survey crew also observed a 3-inch effluent pipeline adjacent to the former Waggoner Building which was discharging a small stream of oily liquid. OVA and HNU readings were taken approximately 6 inches from the surface where this liquid had pooled. The OVA showed concentrations up to 350 ppm, and the HNU showed concentrations ranging from 400 to 900 ppm in this area. Phosgene gas was not detected in any area using the Drager tubes.

HRS scores have been calculated on two separate occasions for Dead Creek. The creek was first scored in July, 1982, by Ecology & Environment, Inc., with a final migration score of 18.48. The site was again scored in March, 1985 by IEPA in an attempt to increase the previous score. IEPAs assessment led to a final score of 29.23, however, this score has not been finalized by USEPA. Route scores for the 1982 assessment were as follows: ground water 4.24, surface water 7.55, and air 30.77. Corresponding route scores in the 1985 assessment were 5.65, 10.07, and 49.23. Observed releases were used for all route scores in both the 1982 and the 1985 scoring packages. The only difference in the assessments was in the value assigned for waste quantity in the three routes. The 1982 package listed waste quantity as unknown (assigned value - 0), while IEPA calculated an approximate volume of waste based on sample results and visual observations.

A significant amount of data has been developed showing a wide range of contaminants in and around CS-B. Review of existing file data indicates numerous possible sources of contamination in the area.

Prior to blocking the culvert at Queeny Avenue, Cerro Copper and Monsanto Chemical reportedly discharged process wastes directly into the creek. According to past IEPA inspection reports the former Waggoner Company, an industrial waste hauling operation, discharged wash waters from truck cleaning activities directly to CS-B. After IEPA order Waggoner to cease this practice, an unlined surface impoundment was apparently used for disposal of wash water. In the 1940s and 1950s sites H and I were used for disposal of various industrial wastes. These sites were actually a single, large disposal area prior to the construction of Queeny Avenue in the late 1940s. In the 1950s, the Midwest Rubber Company, located west of State Route 50 and south of Queeny Avenue, had an effluent pipeline which ran from their plant location to the northern portion of CS-B. Midwest Rubber Co. reportedly discharged process wastes, including oils and cooling water, to the creek. Site G is a surface/subsurface disposal area with corroded drums and other wastes exposed on the surface. Surface drainage for at least a portion of this site is directed to CS-B.

Data Assessment and Recommendations

The scope of field investigation work for CS-B during the Dead Creek Project includes collecting three surface water samples from the Creek in Sector B. This sampling program should be sufficient to characterize the water currently in the creek. Soil gas and ambient air monitoring will also be done in and around CS-B.

Although a great deal of data is available for CS-B, most of the data is 4-6 years old. Because of the dynamic nature of the creek and disposal activities in the area, existing conditions may not be accurately characterized by historical sampling data. Feasibility study activities for CS-B could be accomplished using existing data and applying assumptions concerning chemical profiles (contaminant distribution). However, to properly accomplish the feasibility study activities, a current chemical depth profile of the creek bed should be developed. This would consist of collecting sediment and subsurface soil samples from several locations in the creek bed and along the banks. The hydrology of the area has not been well-defined and should be addressed further. It has not been established whether the ground water discharges to Dead Creek or the creek acts as a recharge conduit for the Henry Formation aquifer. If discharge to the creek is occurring, the subsurface disposal areas (Sites H and I in particular) may be major contributors to the contamination of the creek.

Accordingly, existing IEPA monitoring wells on both sides of the creek should be redeveloped to allow for accurate water level measurements. This, in conjunction with detailed surveying of the creek bed and water levels in the creek, would allow adequate assessment of the hydrology in the area. This would be best accomplished using continuous-recording water level instrumentation, and should be continued over a period of time sufficient to address seasonal fluctuations. In addition, records of industries in the area should be thoroughly reviewed to establish a profile of possible releases from each source.

SECTORS C THROUGH F - DEAD CREEK

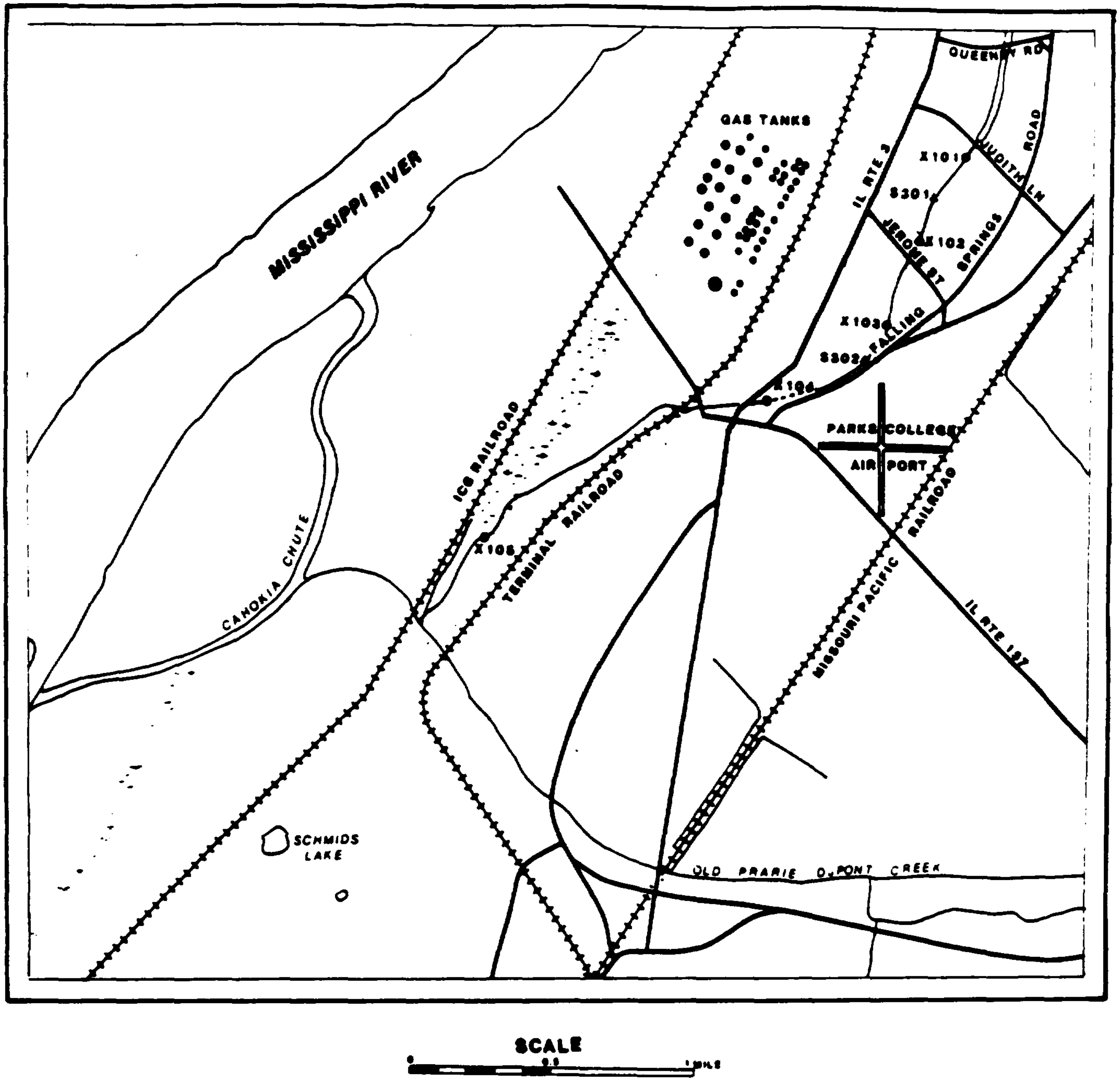
Site Description

Creek Sectors C through F include the entire length of Dead Creek south of Judith Lane. This portion of the creek flows south-southwest through the Village of Cahokia prior to discharge into the Prairie DuPont floodway. The floodway subsequently discharges into the Cahokia Chute of the Mississippi River. The creek is somewhat wider through these sectors than in sectors A and B, and is not as heavily vegetated as Sector B. Creek Sectors C through F are delineated as follows: CS-C- Judith Lane to Cahokia Street, CS-D - Cahokia Street to Jerome Street, CS-E - Jerome Street to the intersection of State Route 3 and State Route 157, CS-F - intersection (as above) to the discharge point in the old Prairie DuPont Creek.

Site History and Previous Investigations

There are no known discharges to Dead Creek south of Judith Lane, although several apparent discharge pipes have been observed during preliminary reconnaissance. Site N of the Dead Creek Project is located immediately east of the creek in the southern portion of CS-C. Land use in the vicinity of Sectors C through F is residential/commercial for the most part. The creek flows underground through a culvert in the southern part of CS-E near Parks College. Although the Culvert under Judith Lane has reportedly been blocked, flow emanating from the culvert has been observed on several occasions.

IEPA collected five sediment and two surface water samples from creek Sectors C through F as part of their Preliminary Hydrogeological Study conducted in 1980. Locations of these samples are shown in Figure C-1, and analytical data is presented in Table C-1. The water samples showed very little evidence of contamination, although concentrations of copper exceeded the IEPA's water quality



LEGEND
X101 SEDIMENT SAMPLING LOCATION
S301 SURFACE WATER SAMPLING LOCATION
RESIDENTIAL AREA

FIGURE C-1
IEPA SAMPLING LOCATIONS CREEK SECTORS C THROUGH F

TABLE C-1: ANALYSIS OF SURFACE WATER AND SEDIMENT SAMPLES FROM CREEK SECTORS C THROUGH F (COLLECTED BY IEPA 9-25-80)

SAMPLE LOCATIONS

PARAMETERS	Water		Sediment				
	S301	S302	x101	x102	x103	x104	x105
Aluminum			12,000				
Arsenic	0.008	0.006	26				
Barium	0.12	0.08	1,300	4,700	210	390	475
Beryllium	-	-	-	3	-	2	-
Boron	0.06	0.04	-	76	-	-	-
Cadmium	-	-	-	50	8	31	2
Calcium			24,000	5,300	210,000	16,000	13,000
Chromium	-	0.01	400	50	60	50	-
Cobalt			40	32	6	8	9
Copper	0.26	0.04	15,000	17,200	320	1,800	360
Iron	0.66	0.87	57,000	110,000	11,000	19,000	18,000
Lead	-	-	800	1,300	260	250	75
Magnesium	3	2	7,100	2,000	10,000	5,100	3,300
Manganese	0.03	0.12	600	170	210	160	200
Mercury			1.2				
Nickel	0.05	0.01	2,000	2,300	45	600	-
Phosphorus	0.19	0.2		6,200	720	1,200	4,200
Potassium	6.6	3.3	2,400	900	1,400	2,100	1,400
Silver	-	-	-	45	10	-	-
Sodium	3	3	800	1,100	100	190	125
Strontium	0.08	0.07	100	140	210	47	43
Vanadium	-	-	-	50	22	31	35
Zinc	0.24	-	12,000	21,000	900	5,600	780
PCB	-	-	0.12	0.12	2.8	2	-

NOTE: All results in ppm.
Blanks indicate parameter not analyzed.
- Indicates below detection limits.

standard in both samples. This was the only parameter in either sample which exceeded the standards.

The sediment samples contained relatively high concentrations of cadmium, chromium, copper, lead, nickel, and zinc. Concentrations of these parameters were several times higher than those found in the background soil sample in the IEPA study (sample x121; see Creek Sector B, Table B-3). Arsenic was also detected in sample x101, but was not analyzed for in the other downstream samples. The highest concentrations of aluminum (12,000 ppm) and boron (76 ppm) in the IEPA study were found in downstream sediment samples x101 and x102, respectively. PCB was the only organic compound detected in the downstream sediment samples, with the highest concentration (2.8 ppm) found in x103. Sample x105 was the only downstream sample that did not contain PCBs. These results illustrate the uneven distribution of contaminants within Dead Creek. While some contaminants in Sectors C through F are lower than in CS-B, barium, cadmium, chromium, lead, and nickel were detected in comparable or higher concentrations than sediments in upstream samples. This could be attributable to the mechanical properties of stream flow, such as gradient, channel dimensions, and flow velocity, or to the existence of unknown contaminant sources located in downstream areas.

<u>Data Assessment and Recommendations</u>

The scope of work for these sectors of the creek during the Dead Creek project includes collecting the following samples: CS-C, 2 surface water, 2 sediment; CS-D, 1 surface water, 2 sediment; CS-E, 3 surface water, 10 sediment; and CS-F, 4 surface water, 10 sediment. The sampling in CS-F will be postponed, pending review of data from the other creek sectors. A soil gas survey and ambient air monitoring will also be conducted in and around Creek Sectors C through E.

For Creek Sectors C through F, waste characterization for the feasibility study activities could be completed with sampling as proposed provided assumptions regarding chemical profiles are made. However, in order to accurately estimate waste quantities and define to what depth contamination has occurred, a more detailed sampling program is necessary. This would include developing a depth profile of chemical constituents in the creek bed. Cores should be taken from upstream and downstream locations, with additional sampling at point sources as necessary.

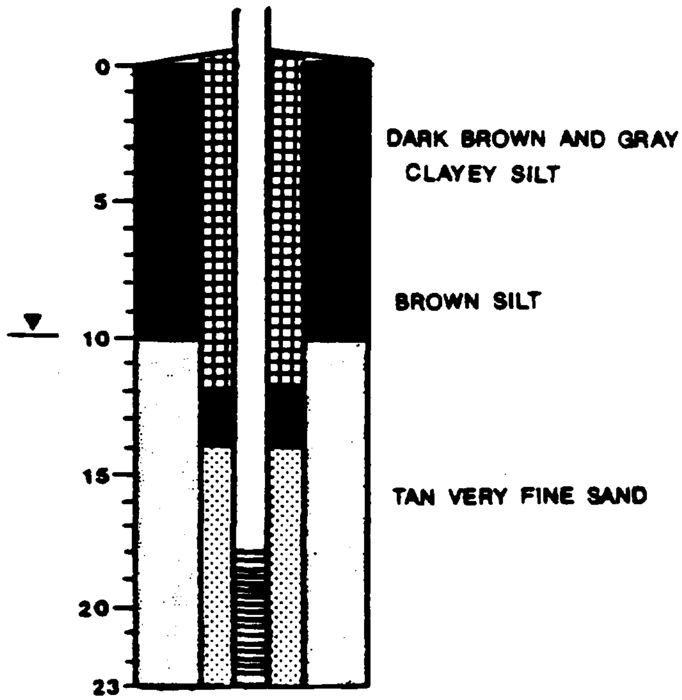
APPENDIX B

BORING LOGS AND MONITORING WELL DATA

Project Name Dead Creek
Project No. IL 3140
Date Prepared 3-25-87
Prepared by Kevin Phillips

Depth (ft) Description

EE-G101



(IEPA well replaced)
Boring/Well No. EE-G101
Location Site G
Owner IEPA
Top of Inner Casing Elev. 412.35
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/25, 2/25/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 23 ft.
Casing and Screen Diam. 2 in.
Screen Interval 18 - 23 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.51 ft.
Well Type monitoring
Well Construction:
Filter Pack 22.5 - 14 ft.
Seal 14 - 12 ft.
Grout 12 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 396.86 Date 3-26-87
Static Water Elev. 398.22 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity 1.3 x 10 cm/sec
Other pH = 7.0
Cond. = 1600 umhos Temp. = 58° F
Cloudy, yellowish

WATER QUALITY

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-17-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes No X
Recipient

Comments

REMARKS

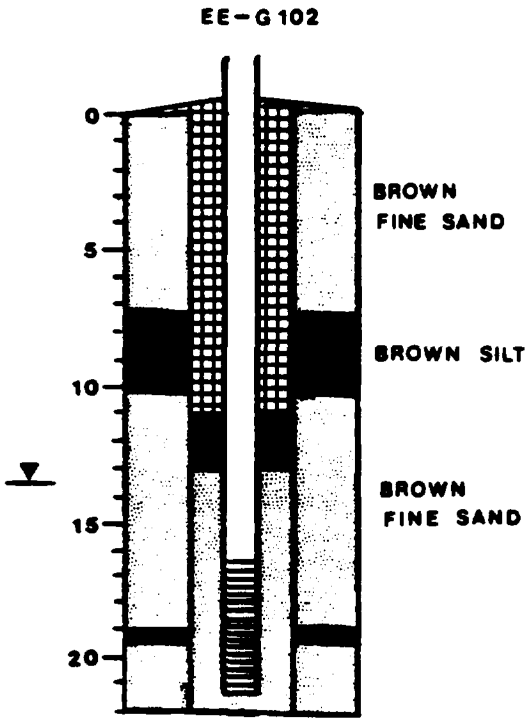
Site Dead Creek Site-G

Boring/Well No. Well #EE-G101
IEPA replacement well

Sample	Depth	Blow Count	Description
			Straight drill boring. Stratigraphic sequence description taken from IEPA report (April 1981) log for monitoring well G-101 boring no. B-1 (10-8-80). <u>0-7.5'</u> Dark brown and gray clayey SILT. Trace of natural organics. <u>7.5-10'</u> Brown micaceous SILT. Water level @ 9.5'. <u>10-15'</u> Tan very fine grain SAND. Arenitic; moderately sorted to rounded. Contains ferro-magnesian minerals. <u>15-32'</u> Tan fine to coarse grain SAND. Arkosic, moderately rounded, poorly sorted, contains ferro-magnesian minerals with some medium gravel. E.O.B. @ 23 ft. (for replacement well #EEG101)

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-26-87
Prepared by Kevin Phillips

Depth (ft) Description



(IEPA well replaced)
Boring/Well No. EE-G102
Location Site G
Owner IEPA
Top of Inner Casing Elev. 409.10
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/26, 2/26/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 21.5 ft.
Casing and Screen Diam. 2 in.
Screen Interval 16.5 - 21.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.22 ft.
Well Type monitoring
Well Construction:
- Filter Pack 22 - 13 ft. Natural
- Seal 13 - 11 ft.
- Grout 11 ft. to surface
- Lock No. 2834

TEST DATA

Static Water Elev. 397.37 Date 3-26-87
Static Water Elev. 398.57 Date 5-11-87
Slug Test Yes X No ___
Test Date 5-12-87
Hydraulic Conductivity 1.4 x 10 cm/sec
Other pH = 6.8
Cond. = 1000 umhos Temp. = 56° F
Clear to yellowish

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes ___ No X
Recipient

Comments

REMARKS

IEPA well

Site Dead Creek Site-G

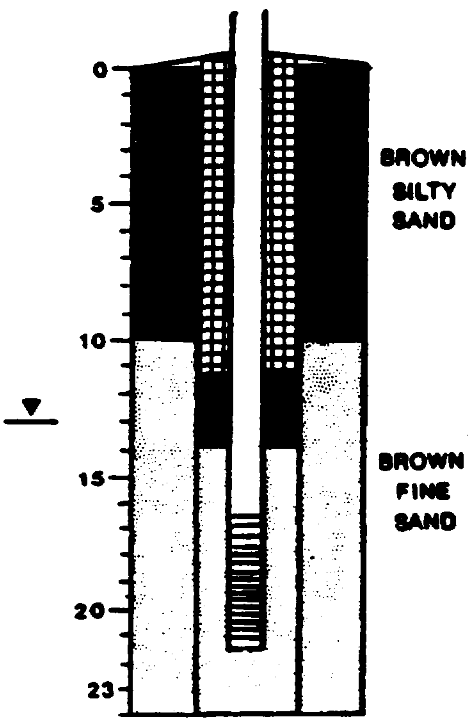
Boring/Well No. Well #EE-G102 (replacement well for IEPA G-102)

Sample Depth	Blow Count	Description
3.5 - 5	2-3-5	0-5 Loose brown silty fine grain SAND. Trace to little silt. Moist.
8.5 - 10	2-2-4	Loose brown sandy SILT. Some fine grain sand. Very moist.
13.5 - 15	2-3-5	Loose brown fine grain SAND. Well sorted and rounded to sub-rounded. Wet.
18.5 - 20	1-2-4	18.5-19 Gray silty fine grain SAND. Wet. 19'-19'10" - Gray very sandy SILT. Wet. 19'10"-20' - Gray very silty fine grain SAND. Wet. 20-21.5" - Gray fine, coarse grain sand (from IEPA log). E.O.B. @ 21.5'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-26-87
Prepared by Kevin Phillips

Depth (ft) Description

EE-G103



(IEPA well replaced)
Boring/Well No. EE-G103
Location Site G
Owner IEPA
Top of Inner Casing Elev. 408.74
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/26, 2/26/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 23.5 ft.
Casing and Screen Diam. 2 in.
Screen Interval 16.5 - 21.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.08 ft.
Well Type monitoring
Well Construction:
Filter Pack 22 - 14 ft. Natural
Seal 14 - 11.5 ft.
Grout 11.5 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 397.43 Date 3-26-87
Static Water Elev. 398.57 Date 5-11-87
Slug Test Yes ___ No X
Test Date
Hydraulic Conductivity
Other pH = 5.2
Cond. = 1200 umhos Temp. = 56° F
Cloudy, yellowish

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-17-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes ___ No X
Recipient

Comments

REMARKS

Site Dead Creek Site-G

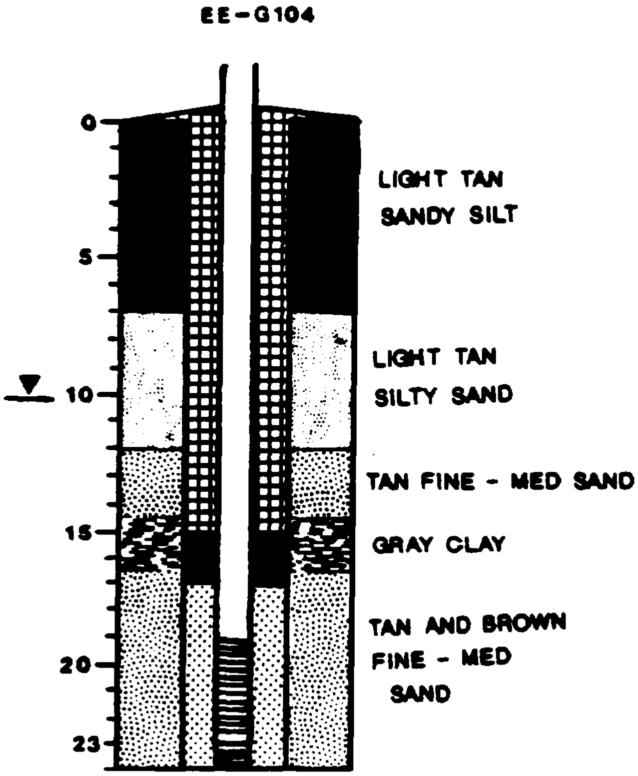
Boring/Well No. Well #EE-G103

Sample Depth	Blow Count	Description
		Straight drill to 8.5'.
		Stratigraphic sequence based on auger cuttings.
8.5 - 10	7-9-10	0-10 Firm brown very silty fine grain SAND. Some silt. Sand is well sorted and rounded to sub-rounded. Moist.
13.5 - 15	5-17-12	Firm brown fine grain SAND. Well sorted. Some black stained stringers throughout. Wet. Slight chemical odor.
18.5 - 20	1-2-3	Loose brown fine grain SAND. Well sorted and rounded. Trace of natural organic layers and wood particles. Wet.
22 - 23.5	5-9-9	Firm brown fine grain SAND. Trace of medium grain sand and small gravel.
		E.O.B. @ 23.5'.

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-25-87
Prepared by Kevin Phillips

Depth (ft) Description

EE-G104



(IEPA well replaced)
Boring/Well No. EE-G104
Location Site G
Owner IEPA
Top of Inner Casing Elev. 408.96
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/25, 2/25/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 24 ft.
Casing and Screen Diam. 2 in.
Screen Interval 19 - 24 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.09 ft.
Well Type monitoring
Well Construction:
Filter Pack 24 - 17 ft.
Seal 17 - 15 ft.
Grout 15 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 397.01 Date 3-26-87
Static Water Elev. 398.24 Date 5-11-87
Slug Test Yes ___ No X
Test Date
Hydraulic Conductivity
Other pH = 6.5
Cond. = 1000 umhos Temp. = 54° F

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-17-87
Samplers E & E
Samples Analysed for HSL compounds

Split Samples Yes ___ No X
Recipient

Comments

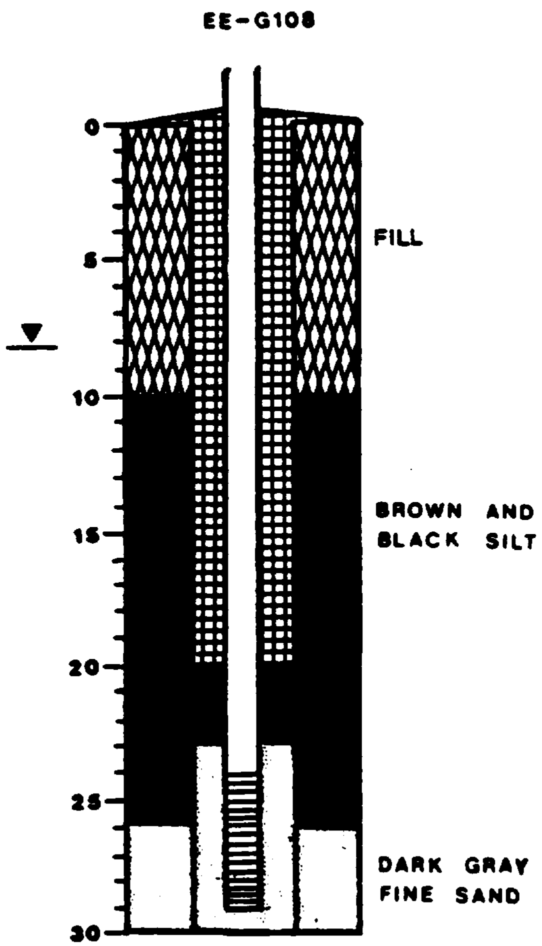
REMARKS

Site Dead Creek Site-G Boring/Well No. Well #EE-G104

Sample	Depth	Blow Count	Description
			Straight drill boring. Stratigraphic sequence description taken from IEPA report (April, 1981) log for monitoring well G-104 boring no. B-4 (10-9-80). <u>0-7</u> Light tan sandy SILT. Trace of clay. <u>7 - 12</u> Light tan silty SAND. Micaceous. <u>12-14.5</u> Tan fine to medium grain SAND. Arkosic. <u>14.5-16.5</u> Gray silty CLAY. <u>16.5-37.5</u> Tan and brown fine to medium grain SAND. Arkosic. Poorly sorted. Subrounded. Trace of small gravel. E.O.B. @ 24' (for replacement well # EEG 104)

Project Name Dead Creek
Project No. IL 3140
Date Prepared 3-2-87
Prepared by Kevin Phillips

Depth (ft) Description



(IEPA well replaced)
Boring/Well No. EE-G108
Location Site G
Owner IEPA
Top of Inner Casing Elev. 407.21
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 3/2/87,3/2/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 30 ft.
Casing and Screen Diam. 2 in.
Screen Interval 24 - 29 ft.
Screen Type stainless steel 0.01" slot
Stickup 0.93 ft.
Well Type monitoring
Well Construction:
Filter Pack 29 - 22 ft.
Seal 22 - 20 ft.
Grout 20 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 397.96 Date 3-26-87
Static Water Elev. 398.85 Date 5-11-87
Slug Test Yes____ No X
Test Date
Hydraulic Conductivity
Other pH = 5.4
Cond. = 1800 umhos Temp. = 56° F
Clear to cloudy No odor

WATER QUALITY

Samples Taken Yes X No____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-18-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No____
Recipient Enviropact

Comments

REMARKS

Site Dead Creek

Boring/Well No. Well #EE-G108
(replacement well for IEPA G-108)

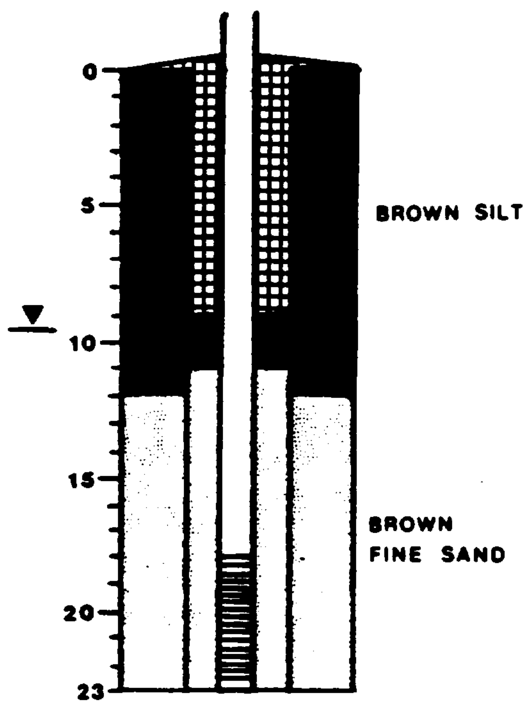
Sample	Depth	Blow Count / Description
		Straight drill to 23.5'
		Stratigraphy sequence based on auger cuttings.
		0-10 FILL consisting of brown-black very silty CLAY.
		10-23.5 Brown clayey SILT.
		23.5-25 Black very sandy SILT. Some fine grain sand. Very moist.
		28.5-30 Black to dark gray silty fine SAND. Well sorted. Wet.
		E.O.B. @ 30'.

(IEPA well replaced)

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	12-18-86
Prepared by	Tim Maley

Depth (ft) Description

EE-G110



Boring/Well No. EE-G110
Location Site G
Owner IEPA
Top of Inner Casing Elev. 409.00
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/18,12/18/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 23.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 18 - 23 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.82 ft.
Well Type monitoring
Well Construction:
- Filter Pack 23 - 11 ft. Natural
- Seal 11 - 9 ft.
- Grout 9 ft. to surface
- Lock No. 2834

TEST DATA

Static Water Elev. 397.49 Date 3-26-87
Static Water Elev. 398.52 Date 5-11-87
Slug Test Yes X No
Test Date 5-13-87
Hydraulic Conductivity 5.3 x 10 cm/sec
Other pH = 6.8
Cond. = 1200 umhos Temp. = 58° F
Clear to yellowish

WATER QUALITY

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes No X
Recipient

Comments

REMARKS

Site Dead Creek Site-G

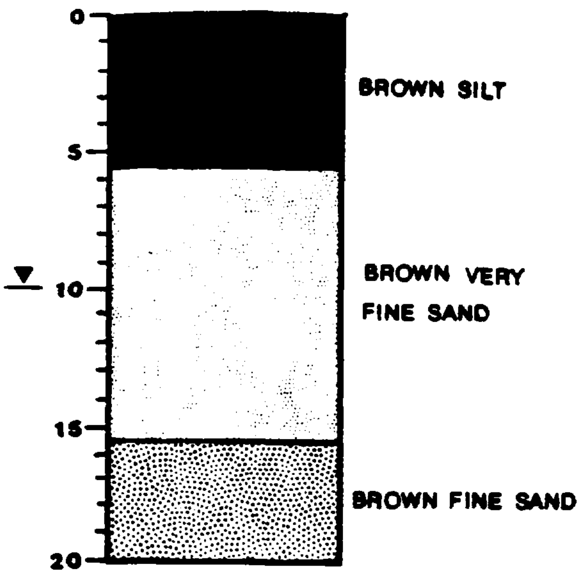
Boring/Well No. Well #EE-G110
IEPA replacement well

Sample Depth	Blow Count	Description
		Straight drill to 13.5'.
		Stratigraphic sequence based on auger cuttings.
		0 to 1' black topsoil.
		1 to 12' brown sandy SILT
		Begin sampling at 13.5'.
13.5 - 15	3-7-6	Brown silty SAND. Wet.
18.5 - 20	3-4-5	Brown to gray fine to medium grain SAND. Wet.
		E.O.B. @ 23'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-12-87
Prepared by Tim Maley

Depth (ft) Description

G - 1



Boring/Well No. G-1
Location Site G
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/12, 1/12/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 0 - 10' and 10 - 20' analyzed for HSL compounds.

REMARKS

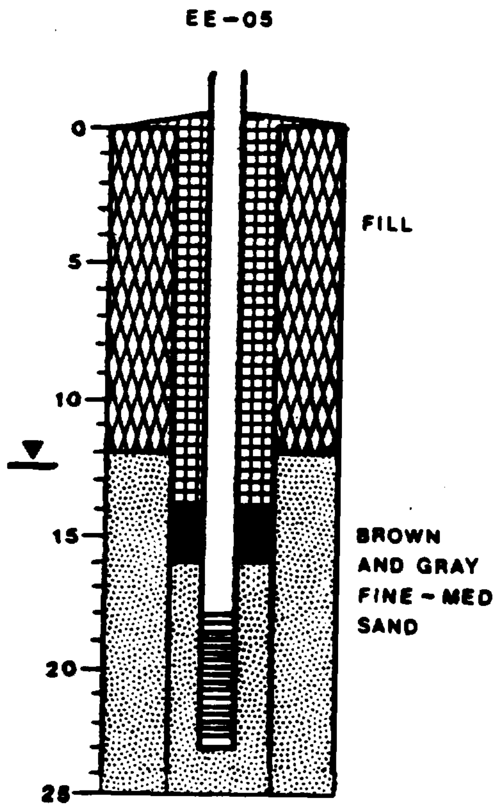
Ground elev. 407.31

Site Dead Creek Site-G Boring/Well No. G-1

Sample Depth	Blow Count	Description
1 - 2.5	2-1-1	Brown SILT. Trace of fine grain sand (dry).
3.5 - 5	1-2-2	Same as above.
6 - 7.5	1-1-1	Brown very fine grain SAND. Trace of silt (wet @ 7').
8.5 - 10	1-1-1	Same as above. Trace of rust and gray coloring among brown very fine grain sand (wet).
11 - 12.5	1-2-3	Brown very fine grain SAND. Increasingly siltier (wet).
13.5 - 15	6-4-8	Same as above.
16 - 17.5	2-7-6	Brown fine grain SAND (wet).
18.5 - 20	4-11-12	Same as above.
		E.O.B. @ 20' Water level @ completion approx. 10'.

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-14-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. G-2/EE-05
Location Site G
Owner IEPA
Top of Inner Casing Elev. 411.36
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/14, 1/14/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 25 ft.
Casing and Screen Diam. 2 in.
Screen Interval 18 - 23 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.3 ft.
Well Type monitoring
Well Construction:
Filter Pack 23 - 16 ft.
Seal 16 - 14 ft.
Grout 14 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 396.69 Date 3-26-87
Static Water Elev. 398.17 Date 5-11-87
Slug Test Yes ___ No X
Test Date
Hydraulic Conductivity
Other pH = 5.2
Cond. = 2200 umhos Temp. = 56° F

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-18-87
Samplers E & E
Samples Analysed for HSL compounds

Split Samples Yes X No ___
Recipient Enviropact

Comments Subsurface soil sample from boring 5 - 15' analysed for HSL compounds.

REMARKS

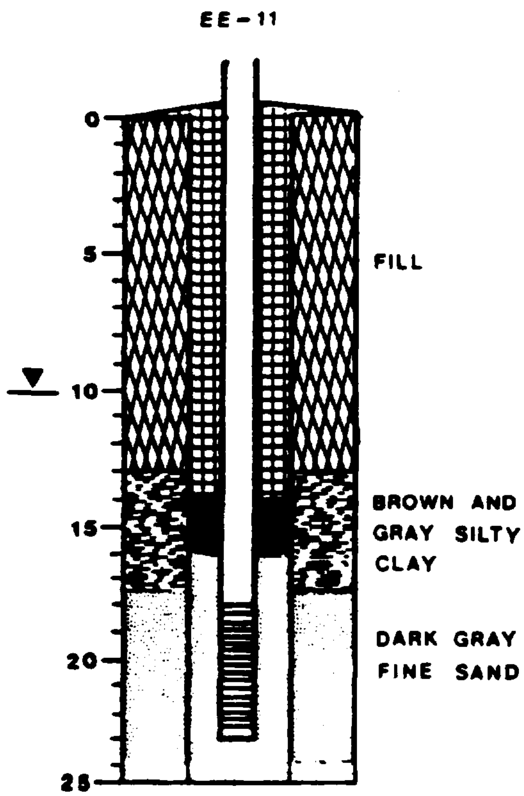
Slight organic odor

Site Dead Creek Site-G Boring/Well No. G-2/Well #EE-05

Sample Depth	Blow Count	Description
1 - 2.5	3-15-6	FILL consisting of black sandy CLAY with a variety of debris materials including slag, wood, crushed limestone, gravel, and iron fragments (dry).
3.5 - 5	3-5-3	FILL same as above (dry).
6 - 7.5	1-1-1	FILL consisting of brown silty CLAY. Trace of coarse grain sand and paper products (dry).
8.5 - 10	1-0-1	FILL consisting of light gray silty CLAY. Trace of asphalt and a purple paint-like residue substance (dry).
11 - 12.5	1-3-5	FILL (to 12 feet) consisting of dark brown silty CLAY. From 12 feet is gray medium grain sand (moist).
13.5 - 15	3-4-5	Brown-gray medium grain SAND (wet).
16 - 17.5	2-5-10	Brown fine grain SAND. Trace of silt (wet).
18.5 - 20	1-1-5	Same as above. With less silt.
23.5 - 25	7-14-18	Gray fine grain SAND. Trace of silt (wet).
		E.O.B. @ 25

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-26-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. G-3/EE-11
Location Site G
Owner IEPA
Top of Inner Casing Elev. 409.02
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/26-1/26/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 25 ft.
Casing and Screen Diam. 2 in.
Screen Interval 18 - 23 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.57 ft.
Well Type monitoring
Well Construction:
Filter Pack 23 - 16 ft.
Seal 16 - 14 ft.
Grout 14 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 397.04 Date 3-26-87
Static Water Elev. 398.26 Date 5-11-87
Slug Test Yes ___ No X
Test Date
Hydraulic Conductivity
Other pH = 7.2
Cond. = 7000 umhos Temp. = 56° F
Brown to black

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ___
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 10' - 20' analysed for HSL compounds.

REMARKS

Slight organic odor

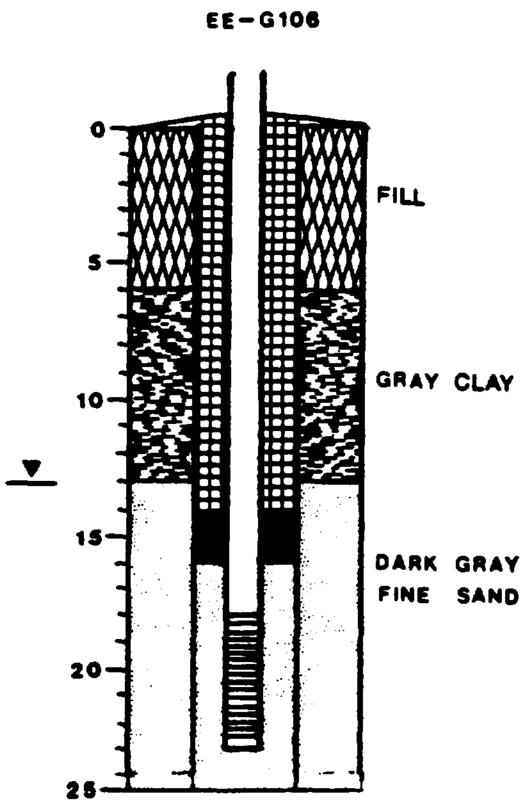
Site Dead Creek Site-G

Boring/Well No. G-3/Well #EE-11

Sample Depth	Blow Count	Description
1 - 2.5	8-10-11	FILL consisting of brown-black (mottled) silty CLAY. Trace of medium grain sand and wood particles (dry).
3.5 - 5	1-0-6	FILL consisting of dark brown silty CLAY. Trace of fine grain sand and wood particles (moist).
6 - 7.5	6-5-8	FILL consisting of brown-gray-black sandy CLAY. Trace of slag, coarse grain sand, gravel, and wood particles (moist).
8.5 - 10	7-8-11	FILL consisting of black silty CLAY. Trace of slag, coarse sand, and limestone fragments (moist).
11 - 12.5	2-3-3	FILL consisting of brown-gray silty CLAY. Trace of fine grain sand and wood particles (moist).
		FILL discontinues @ approx. 13'.
13.5 - 15	1-2-3	Brown-gray silty CLAY. Trace of fine grain sand (moist).
16 - 17.5	1-2-2	Same as above. (tip of spoon showed gray fine grain sand, moist to wet).
18.5 - 20	0-0-1	Dark gray fine grain SAND (wet).
21 - 22.5	0-4-8	Dark gray very fine grain SAND. Increasingly siltier (wet).
23.5 - 25	4-5-6	Dark gray fine grain SAND. Trace of coarse grain sand and small gravel. Some black staining @ 25'. (wet).
		E.O.B @ 25'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-27-87
Prepared by Tim Maley

Depth (ft) Description



(IEPA well replaced)
Boring/Well No. G-4/EE-G106
Location Site G
Owner IEPA
Top of Inner Casing Elev. 407.97
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/26, 1/27/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 25 ft.
Casing and Screen Diam. 2 in.
Screen Interval 18 - 23 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.44 ft.
Well Type monitoring
Well Construction:
Filter Pack 23 - 16 ft. Natural
Seal 16 - 14 ft.
Grout 14 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 397.40 Date 3-26-87
Static Water Elev. 398.52 Date 5-11-87
Slug Test Yes ___ No X
Test Date
Hydraulic Conductivity
Other pH = 7.4
Cond. = 4200 umhos Temp. = 58° F
Dark, cloudy Strong organic odor

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds, volatile organics

Split Samples Yes ___ No X
Recipient

Comments Subsurface soil samples from boring 5 - 20' analyzed for HSL compounds.

REMARKS

Site Dead Creek Site-G

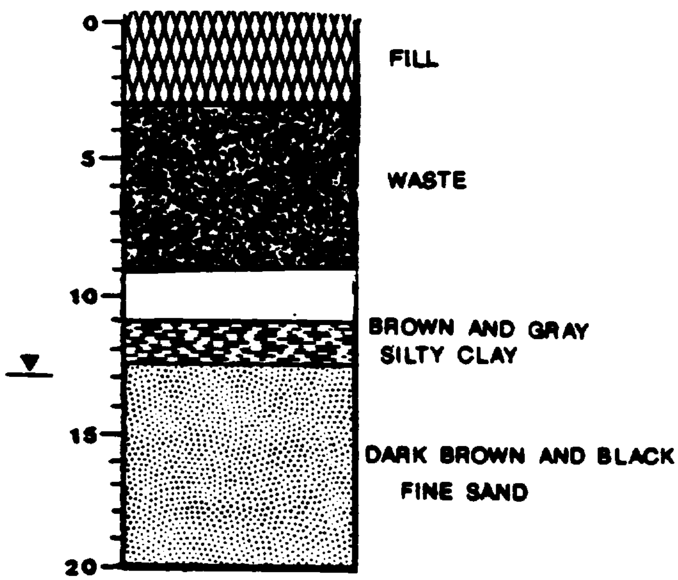
Boring/Well No. G-4/well #EE-G106
(IEPA replacement well)

Sample Depth	Blow Count	Description
1 - 2.5	15-7-9	FILL <u>0-1.5'</u> Black sandy CLAY <u>1.5-2'</u> Crushed limestone <u>From 2'</u> Gray silty clay. Trace of fine grain sand (dry).
3.5 - 5	1-2-2	FILL consisting of brown-black (mottled) silty CLAY. Trace of rust color and fine grain sand (dry). FILL discontinues @ approx. 6'.
6 - 7.5	1-0-2	Gray silty CLAY. Trace of very fine grain sand (moist).
8.5 - 10	1-2-2	Same as above with increased moisture and very fine grain sand.
11 - 12.5	1-2-2	Same as above. Some black staining at 12'.
13.5 - 15	1-2-5	Dark gray very fine grain SAND. Trace of silt and black staining (wet).
16 - 17.5	0-1-3	Black fine grain SAND (stained). Light and dark laminated banding of black staining (wet).
18.5 - 20	1-2-5	Dark gray fine grain SAND (wet).
21 - 22.5	4-9-8	Black fine grain SAND. Trace of silt (wet).
23.5 - 25	7-13-21	Gray fine grain SAND (wet).
		E.O.B. @ 25'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-27-87
Prepared by Tim Maley

Depth (ft) Description

G - 5



Boring/Well No. G-5
Location Site G
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/27, 1/27/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.

REMARKS

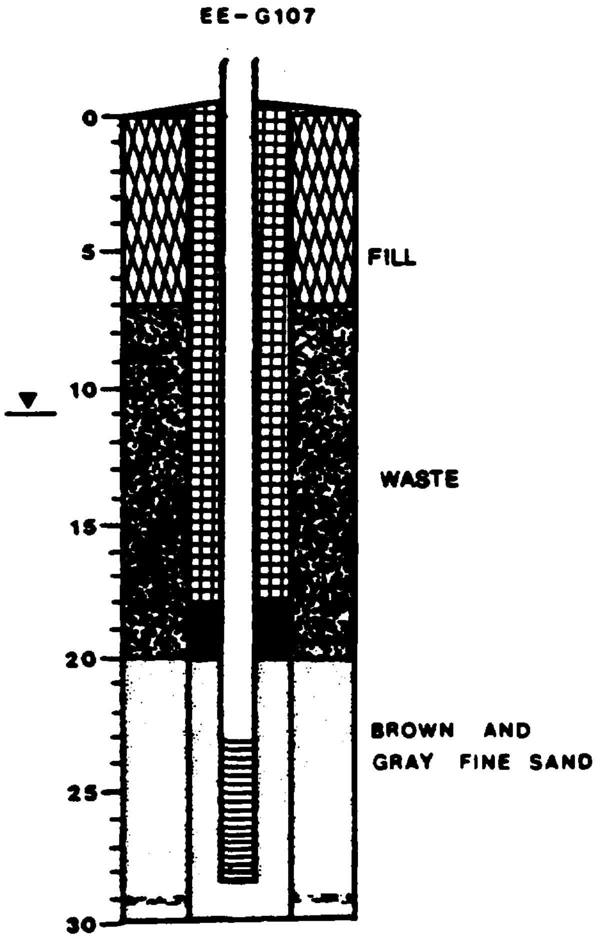
Ground elev. 408.02

Site Dead Creek Site-G   Boring/Well No. G-5

Sample Depth	Blow Count	Description
1 - 2.5	4-2-2	FILL consisting of brown-black silty CLAY with a variety of debris including wood particles, coarse grain sand, yellow clay-like substance.
3.5 - 5	1-2-2	WASTE. CLAY and SAND with black tar-like substance. Moist.
6 - 7.5	21-12-5	No recovery. Black stained wood in tip of spoon. (wet)
8.5 - 10	4-5-9	WASTE consisting of brown-gray silty CLAY. Trace of wood particles and black staining. (wet)
		WASTE discontinues @ approx. 9.0'.
11 - 12.5	4-7-8	Dark brown-gray silty CLAY. Trace of black staining and thin fine grain seams @ 12'.
13.5 - 15	2-5-6	Dark brown fine grain SAND. Trace of black staining and silt. (wet)
16 - 17.5	2-6-7	Black fine grain SAND. (wet)
18.5 - 20	2-6-9	Same as above. (wet) Thinly laminated with black staining.
		E.O.B. @ 20'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-23-87
Prepared by Kevin Phillips

Depth (ft) Description



(IEPA well replaced)
Boring/Well No. G-6/EE-G107
Location Site G
Owner IEPA
Top of Inner Casing Elev. 406.67
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/23, 2/23/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 30 ft.
Casing and Screen Diam. 2 in.
Screen Interval 23 - 28 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.12 ft.
Well Type monitoring
Well Construction:
Filter Pack 28 - 23 ft.
Seal 20 - 18 ft.
Grout 18 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 397.15 Date 3-26-87
Static Water Elev. 398.32 Date 5-11-87
Slug Test Yes ___ No X
Test Date
Hydraulic Conductivity
Other pH = 4.8
Cond. = 3600 umhos Temp. = 62° F

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-18-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ___
Recipient Enviropact

Comments

REMARKS

Site Dead Creek Site-G

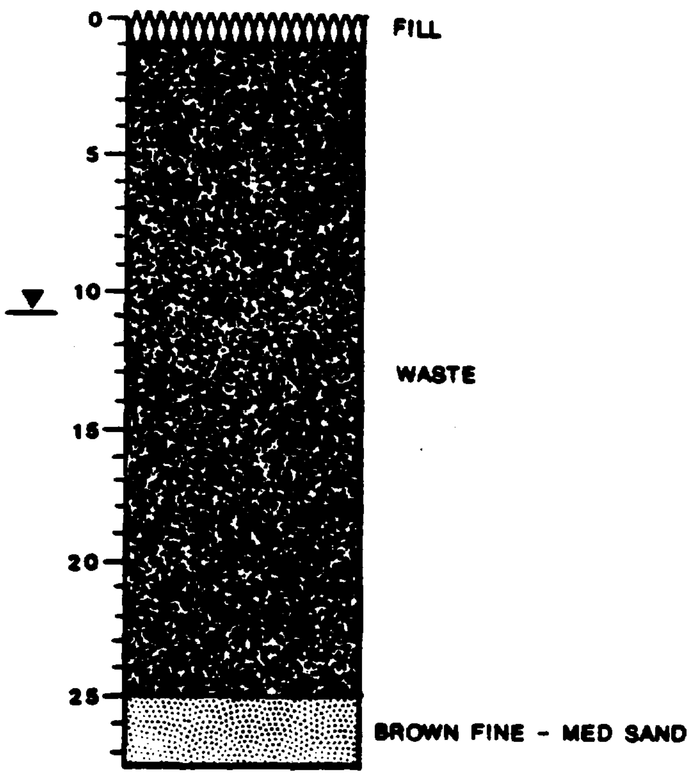
Boring/Well No. G-6/well #EE-G107
(IEPA Replacement well)

Sample Depth	Blow Count	Description
0 - 2.5	15-3-5	FILL consisting of loose fine to medium grain SAND. Trace of medium gravel, slag, and wood particles. (moist)
3.5 - 5	1-1-2	No recovery. Possible void in fill/debris material.
6 - 7.5	11-14-7	FILL consisting of various debris including wood particles, rubber, sand, and gravel. (moist)
8.5 - 10	2-3-24	WASTE consisting of black flaky material. Shale-like and fissile. (dry)
11 - 12.5	5-1-2	WASTE - same as above. (wet)
13.5 - 15	3-2-1	WASTE consisting of small to medium crushed gravel and cloth products. (wet)
16 - 17.5	1-1-1	WASTE - same as above with paper products. (wet)
18.5 - 20	1-1-1	WASTE consisting of black silty sludge. Some glass fragments and gravel. (wet) WASTE discontinues @ approx. 20'.
21 - 22.5	1-2-2	Brown-gray silty fine grain SAND. Well sorted and well rounded. 3 inch varved sandy silt layer in tip of spoon, sample stained throughout (wet).
23.5 - 25	1-3-3	Same as above. Obvious staining throughout sample. Soft gray silty organic clay layer @ 24'-24'3". (wet)
28.5 - 30	8-12-12	28.5'-29' Brown fine grain SAND. Trace of silt. (wet) 29'-29'2" Gray very silty organic CLAY. Trace of fine grain sand. 29'2"-30' Black stained fine to medium grain SAND. Well sorted and well rounded. (wet) E.O.B. @ 30'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-24-87
Prepared by Kevin Phillips

Depth (ft) Description

G - 7



Boring/Well No. G-7
Location Site G
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/24, 2/24/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 27.5 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes____ No____
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes____ No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes____ No X
Recipient

Comments Subsurface soil samples from boring 10 - 25' analyzed for HSL compounds.

REMARKS

Ground elev. 407.13

Site Dead Creek Site-G | Boring/Well No. G-7

Sample Depth	Blow Count	Description
0 - 2.5	30-50/2	WASTE consisting of reddish-brown and black mottled silty CLAY. Some small gravel. Trace of fine to medium grain sand, brick, wood, concrete, and large gravel. (dry)
3.5 - 5	6-3-4	WASTE - Brick, large gravel, concrete, medium sand. (dry)
6 - 7.5	8-2-2	WASTE 6'-7' Same as above 7'-7.5' Black silt-like sludge. Trace of wood chips. (moist)
8.5 - 10	4-10-10	WASTE 8.5'-9.5' Black silty-like sludge. Some fine grain sand. (very moist) 9.5'-10' Brown silty clay. Some fine grain sand. Trace of black staining. (moist)
11 - 12.5	1-1-7	WASTE Black material including oily stained paper and wood products. (wet)
13.5 - 15	6-0-1	WASTE - same as above.
16 - 17.5	7-8-8	No recovery - fill including paper products.
18.5 - 20	3-1-1	WASTE consisting of black (stained) fine grain SAND. Trace of paper products and wood. Very loose. (wet)
21 - 22.5	8-7-5	WASTE - same as above.
23.5 - 25	5-4-21	WASTE - consisting of black oily sandy material including paper and wood products. (wet) FILL discontinues @ approx. 25'.
26 - 27.5	8-7-7	Brown fine to medium grain SAND. Well rounded and well sorted. Wood fibers @ 26.5-27'. (wet)
		E.O.B. @ 27.5'

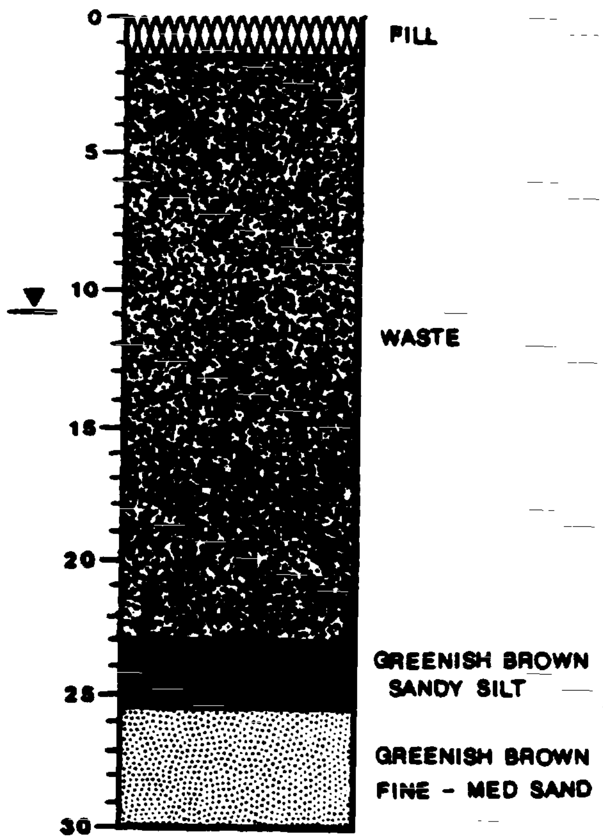
Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-24-87
Prepared by Kevin Phillips

Boring/Well No. G-8
Location Site G
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/24, 2/24/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

Depth (ft) Description

G-8



WELL DATA

Hole Diam. 8 in.
Boring Depth 30.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No X
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.

REMARKS

Ground elev. 406.57

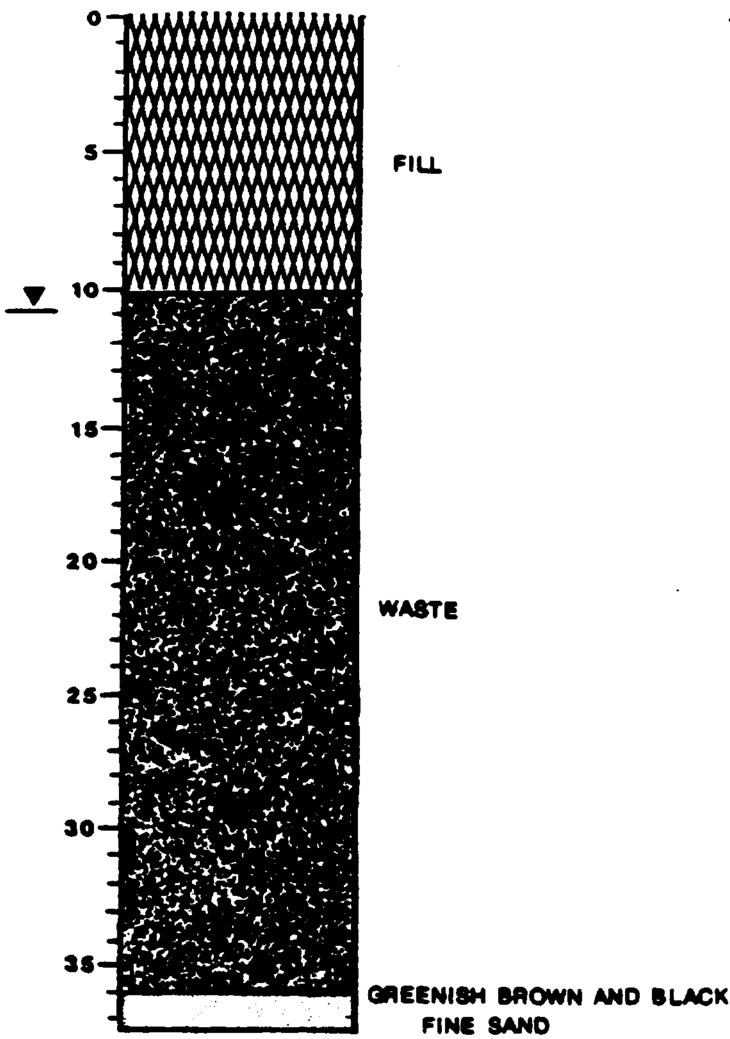
Site Dead Creek Site-G Boring/Well No. G-8

Sample Depth	Blow Count	Description
0 - 2.5	5-10-15	FILL 0-1.5 Brown silty CLAY. Some fine grain sand, brick, and glass fragments. WASTE 1.5-2.5 Black (oily stained) silty CLAY. Some paper products and glass fragments. (moist)
3.5 - 5	5-9-3	WASTE consisting of gray silty CLAY. Some crushed gravel and wood. Black stained sandy layers @ 3.5-4'. (moist)
6 - 7.5	2-3-2	WASTE consisting of black (stained) silty CLAY and small gravel. (moist)
8.5 - 10	2-1-0	WASTE consisting of black (stained) oily CLAY. Some small gravel and and medium grain sand. (very moist)
11 - 12.5	1-3-5	WASTE consisting of black (heavily stained) oily material. Mottled with with white chalky material. (wet)
13.5 - 15	3-50/3	WASTE consisting of black oily sludge-like material including wood.
16 - 17.5	7-12-9	WASTE - Black stained compacted cardboard, paper, and wood. (wet)
18.5 - 20	3-14-31	WASTE - Black sludge and compacted waste, metal and wood (wet).
21 - 22.5	4-3-0	WASTE - same as above. WASTE discontinues @ approx. 23'.
23.5 - 25	2-2-2	Greenish-brown sandy SILT. Some black staining. (wet)
26 - 27.5	3-5-7	Greenish-brown fine grain SAND. Some black staining. Oily sheen. (wet)
28.5 - 30	1-4-9	Brown fine to medium grain SAND. Some black staining. (wet)
		E.O.B. @ 30'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-24-87
Prepared by Kevin Phillips

Depth (ft) Description

G-9



Boring/Well No. G-9
Location Site G
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/24, 2/24/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

'ole Diam. 8 in.
oring Depth 37.5 ft.
asing and Screen Diam.
creen Interval
creen Type
tickup
ell Type
ell Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

tatic Water Elev. Date
tatic Water Elev. Date
lug Test Yes No
est Date
ydraulic Conductivity
ther

WATER QUALITY

amples Taken Yes No X
o. of Samples
ypes of Samples

ate Sampled
amplers
amples Analyzed for

plit Samples Yes No X
ecipient

omments Subsurface soil samples from boring 35 - 40' analyzed for HSL compounds.

REMARKS

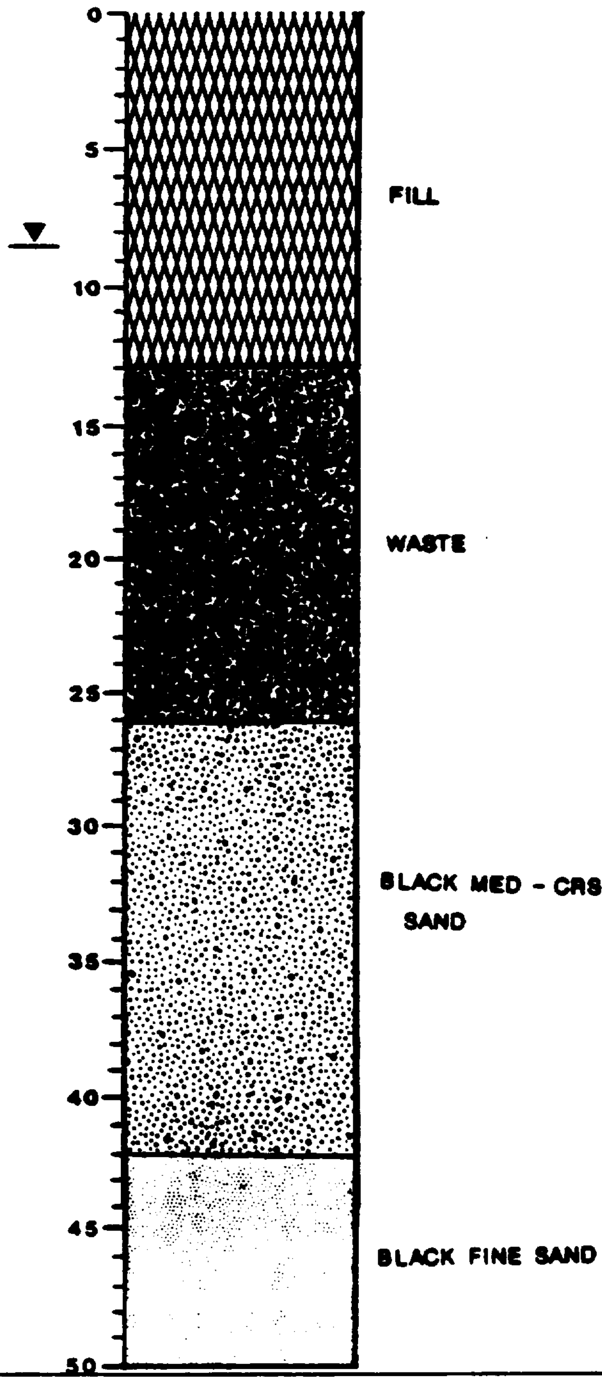
Ground elev. 407.70

Site Dead Creek Site-G Boring/Well No. G-9

Sample Depth	Blow Count	Description
0 - 2.5	3-5-5	FILL consisting of black and reddish brown silty CLAY. Trace of small gravel. (moist)
3.5 - 5	3-6-6	FILL (uncompacted) consisting of brown silty CLAY with some medium grain sand and small to medium gravel.
6 - 7.5	3-1-1	1" recovery of uncompacted fill.
8.5 - 10	6-2-2	Little recovery - still in uncompacted fill material including wood chips.
11 - 12.5	1-0-0	WASTE consisting of black fiberous material with pink grease-like globules. (wet) Pink globules float on water.
13.5 - 15	1-2-2	WASTE consisting of black sludge-like material including wood chips. (moist)
16 - 17.5	4-5-6	WASTE 16'-17 1/4' Black oily sludge material including small spherical beads. (approx BB. size) (wet) 17 1/4'-17 1/2' Gray sandy silt. Some black staining. (wet)
18.5 - 20	5-7-9	WASTE consisting of black (oily stained) sandy sludge. Some fiberous cloth products. (wet)
21 - 22.5	5-2-2	WASTE consisting of black (oily stained) sandy sludge including cardboard, wood, small spherical beads, paper products, and a thick peanut butter like substance @ 27'. (wet)
23.5 - 25	3-7-24	WASTE - Black paper, cardboard, and wood. (wet)
26 - 27.5	4-7-9	WASTE - Black sludge and wood fibers. Black fine sand in tip.
28.5 - 30	10-50/4	WASTE - same as above with metal banding.
31 - 32.5	7-10-14	WASTE - Black stained wood particles.
33.5 - 35	3-2-8	WASTE - Black sludge. WASTE discontinues @ approx. 36'.
36 - 37.5	8-15-12	Greenish brown-black (stained) oily fine grain SAND. Well sorted and well rounded. (wet) E.O.B. @ 37.5'.

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-18-86
Prepared by Tim Maley

Depth (ft) Description
H - 1



Boring/Well No. H-1
Location Site H
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12-18-86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers and rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 50.0 ft.
Casing and Screen Diam. ______
Screen Interval ______
Screen Type ______
Stickup ______
Well Type ______
Well Construction:
Filter Pack ______
Seal ______
Grout ______
Lock No. ______

TEST DATA

Static Water Elev. ______ Date ______
Static Water Elev. ______ Date ______
Slug Test Yes ______ No ______
Test Date ______
Hydraulic Conductivity ______
Other ______

WATER QUALITY

Samples Taken Yes ______ No X
No. of Samples ______
Types of Samples ______

Date Sampled ______
Samplers ______
Samples Analyzed for ______

Split Samples Yes ______ No X
Recipient ______

Comments Subsurface soil samples from boring 15 - 25' and 35 - 50' analyzed for HSL compounds.

REMARKS

Strong organic odor

Ground elev. 407.29

Site Dead Creek Site-N Boring/Well No. N-1

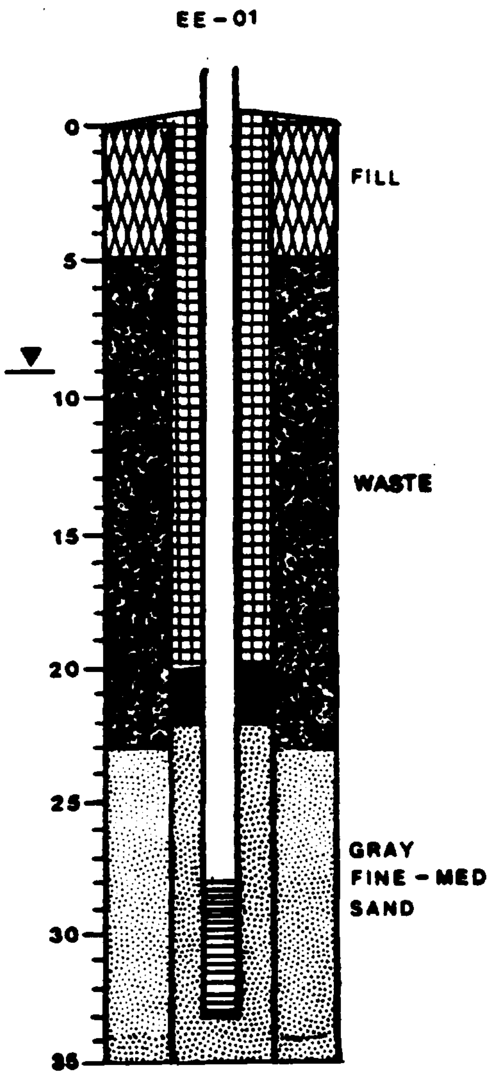
Sample Depth	Blow Count	Description
1 - 2.5	3-3-8	FILL consisting of black sandy CLAY with some brick and crushed limestone fragments (dry).
3.5 - 5	1-3-2	FILL consisting of brown-black silty CLAY. Trace of small to large gravel and medium grain sand (dry).
6 - 7.5	16-5-4	FILL same as above. Some black asphalt-like substance at 6'.
8.5 - 10	12-7-6	FILL consisting of brown fine to medium grain sand and small gravel. Some crushed limestone fragments. (wet).
11 - 12.5	4-4-5	FILL same as above. (wet)
13.5 - 15	2-2-1	WASTE - Broken glass and wood.
16 - 17.5	5-8-22	WASTE - same as above (wet).
18.5 - 20	8-10-15	WASTE - consisting of black (oily stained) sludge-like material including various debris such as concrete, rubber, paper products, wood chips, and small gravel. (wet).
21 - 22.5	4-8-6	WASTE - same as above.
23.5 - 25	4-10-8	WASTE - same as above.
		WASTE discontinues @ approx. 26'.
26 - 27.5	1-1-1	Black (stained) medium to coarse grain SAND. Trace of small gravel. (wet)
28.5 - 30	10-14-16	Same as above.
31 - 32.5	6-8-10	Same as above with increased amount of small to large gravel.
33.5 - 35	15-17-21	Same as above with less black staining and less gravel.
36 - 37.5	10-13-16	Same black (stained) medium to coarse grain SAND. Decreasing amount of gravel. (wet)
38.5 - 40	8-11-10	Black (stained) medium grain SAND. (wet)

Site Dead Creek Site-N Boring/Well No. N-1 (con't)

Sample Depth	Blow Count	Description
41 - 42.5	11-19-21	Same as above to 42'. From 42' black (stained) fine grain SAND. (wet)
43.5 - 45	11-11-14	Same as above.
46 - 47.5	10-14-14	Same as above.
48.5 - 50	10-15-18	Same as above.
		E.O.B. @ 50'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-6-87
Prepared by Kevin Phillips

Depth (ft) Description



Boring/Well No. H-2/EE-01
Location Site H
Owner IEPA
Top of Inner Casing Elev. 408.84
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/5/87,1/6/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 35.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.3 ft.
Well Type monitoring
Well Construction:
Filter Pack 33 - 22 ft.
Seal 22 - 20 ft.
Grout 10 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 397.41 Date 3-26-87
Static Water Elev. 398.55 Date 5-11-87
Slug Test Yes ___ No X
Test Date
Hydraulic Conductivity
Other ph = 6.8
Cond. = 2600 umhos Temp. = 56° F
Yellow-brown color, turbid

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples Groundwater

Date Sampled 3-17-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes ___ No X
Recipient

Comments Subsurface soil sample from boring 5 - 20' analyzed for HSL compounds.

REMARKS

Strong organic odor

Site Dead Creek Site-H

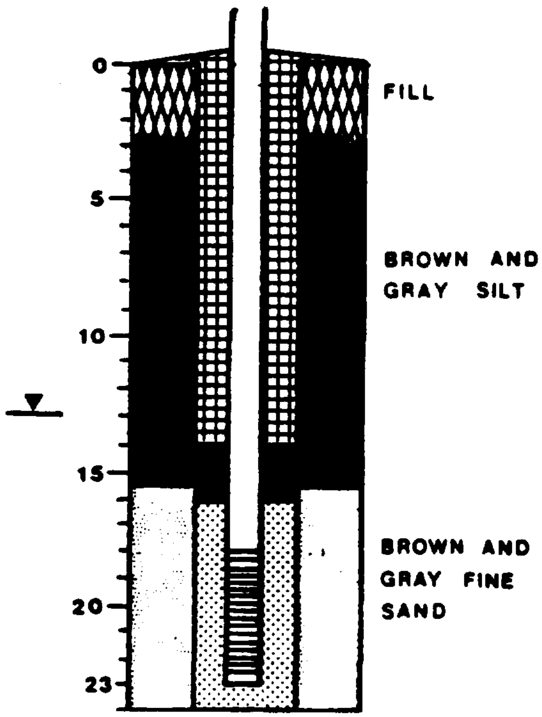
Boring/Well No. H-2/well # EE-01

Sample Depth	Blow Count	Description
1 - 2.5	3-3-4	0-1.5 FILL consisting of black cinders and small gravel. (dry) 1.5-2.5 FILL consisting of brownish cinders, slag, and medium grain sand. (dry)
3.5 - 5	2-3-3	3.5-4 FILL - same as above. 4-5 FILL consisting of dark gray SILT. Soft and stained. Little of fine grain sand. (very moist)
6 - 7.5	35-17-19	WASTE steel and a coal-like dense black flaky substance.
8.5 - 10	2-3-3	WASTE - Wood and paper products, heavy black staining.
11 - 12.5	3-3-5	WASTE - same as above.
13.5 - 15	2-3-5	WASTE consisting of black (stained) silt, medium grain sand and wood. (wet)
16 - 17.5	4-8-9	WASTE - Wood chips.
18.5 - 20	5-7-14	WASTE - same as above.
21 - 22.5	9-10-13	WASTE - same as above.
		WASTE discontinues @ approx. 23'.
23.5 - 25	2-1-6	Firm brownish-gray fine-medium grain SAND. Black staining throughout. Well-rounded and well sorted. Rounded to subangular. (wet)
33.5 - 35	9-10-12	Dense gray fine-medium grain SAND. Trace of coarse grain sand. Fairly well sorted and rounded to subangular. (wet)
		E.O.B. @ 35

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-6-87
Prepared by Kevin Phillips

Depth (ft) Description

EE-02



Boring/Well No. H-3/EE-02
Location Site H
Owner IEPA
Top of Inner Casing Elev. 409.91
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/6/87,1/6/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 23.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 18 - 23 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.25 ft.
Well Type monitoring
Well Construction:
Filter Pack 23 - 16 ft.
Seal 16 - 14 ft.
Grout 14 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 397.58 Date 3-26-87
Static Water Elev. 398.61 Date 5-11-87
Slug Test Yes____ No X
Test Date
Hydraulic Conductivity
Other pH = 4.0
Cond. = 4200 umhos Temp. = 54 F
Yellowish

WATER QUALITY

Samples Taken Yes X No____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-17-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes____ No X
Recipient

Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.

REMARKS

Slight organic odor

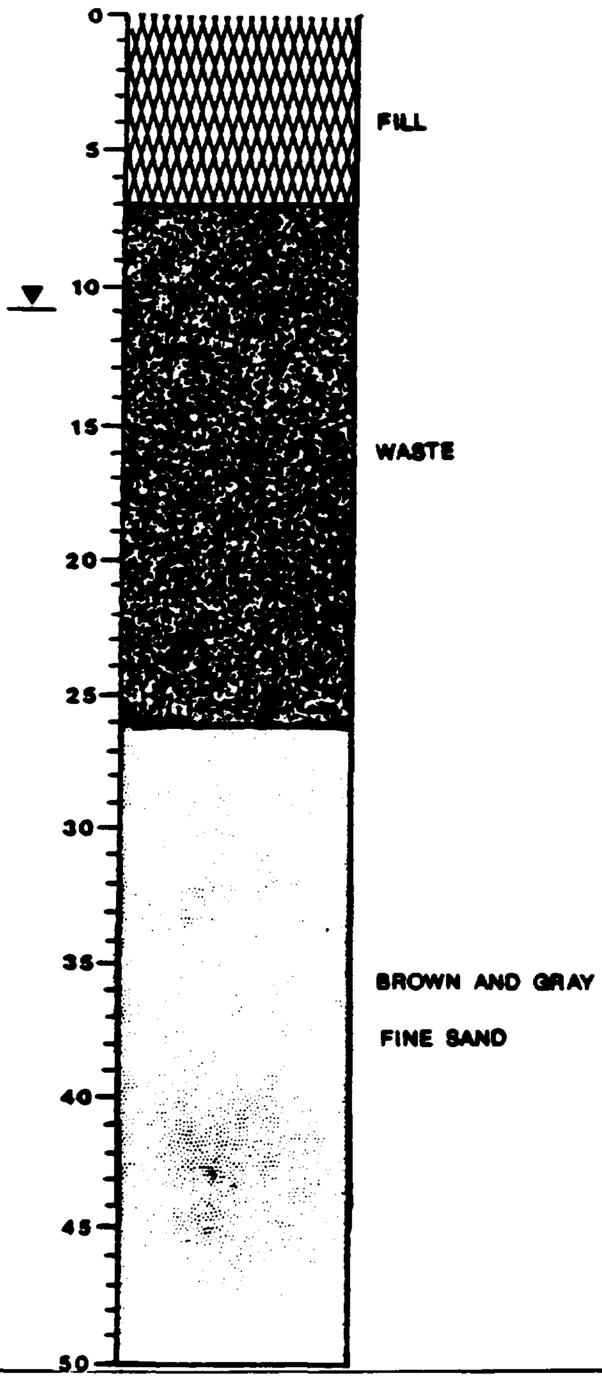
Site Dead Creek Site-H Boring/Well No. H-3/well #EE-02

Sample Depth	Blow Count	Description
1 - 2.5	6-10-13	0-2.5 FILL consisting of dense brown sandy CLAY including small gravel, cinders, and brick fragments.
3.5 - 5	2-3-4	Firm brown SILT and silty CLAY. Trace of fine grain sand. (moist).
6 - 7.5	2-4-6	Firm brown to yellowish brown very sandy SILT. Some fine grain sand and trace of silty clay. (moist)
8.5 - 10	2-2-2	Same as above. (very moist)
11 - 12.5	5-11-14	Dense brownish-gray silt and fine grain SAND. (wet)
13.5 - 15	7-7-7	Same as above.
		Water table @ approx. 13 feet.
16 - 17.5	9-10-20	Very dense gray very silty fine grain SAND. Some silt. Wet.
18.5 - 20	9-10-11	(From 18 to 23 feet) tan dense very fine grain SAND. Very well sorted. Wet.
		E.O.B. @ 23 feet.

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-8-87
Prepared by Kevin Phillips

Depth (ft) Description

H - 4



Boring/Well No. H-4
Location Site H
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/7 & 1/8/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers and rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 50.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 10 - 25' analyzed for HSL compounds.

REMARKS

Ground elev. 408.28

Site Dead Creek Site-H Boring/Well No. H-4

Sample Depth	Blow Count	Description
1 - 2.5	6-9-12	FILL consisting of black silty CLAY and cinders, brick fragments, and medium grain sand. Dry.
3.5 - 5	2-3-10	FILL consisting of black very sandy CLAY. Some slag and black staining. Moist.
6 - 7.5	6-13-15	6-7' FILL same as above, 7-7.5' WASTE Very heavy black oil or tar like staining (approximately 3 inches thick)
8.5 - 10	4-5-2	8.5-9 FILL consisting of brown silty CLAY. 9-10 WASTE Black (heavily stained) sludge-like material with a trace of flecks. Very moist.
11 - 12.5	2-3-2	WASTE black sludge. Wet.
13.5 - 15	3-2-2	WASTE same as above, including hard small spherical beads (1/8" dia.), and paper products. Wet with a visible oily sheen.
16 - 17.5	2-2-2	WASTE same as above, including granular material and broken glass fragments. (Some of the glass fragments appeared to have a threaded top such as a sample jar). Wet.
18.5 - 20	3-4-5	WASTE same as above, including a greenish-yellow jelly like material. Wet with an oil or tar like substance adhering to the spoon.
21 - 22.5	9-16-11	WASTE same as above, including a white granular material veined with brownish-red, glass fragments, and burnt wood. Wet.
23.5 - 25	2-2-15	WASTE consisting of multi-colored (red, green, brown, black, and white) materials; including a chunk of a waxy white substance that breaks into flakes. WASTE discontinues @ approx. 26'.
26 - 27.5	10-15-17	Firm brownish-gray fine grain SAND. Some silt. Wet. Very clayey @ 26'-26.5'.
28.5 - 30	1-1-1	Very loose brown fine grain SAND. Trace of medium to coarse grain sand. Very well sorted. Wet.

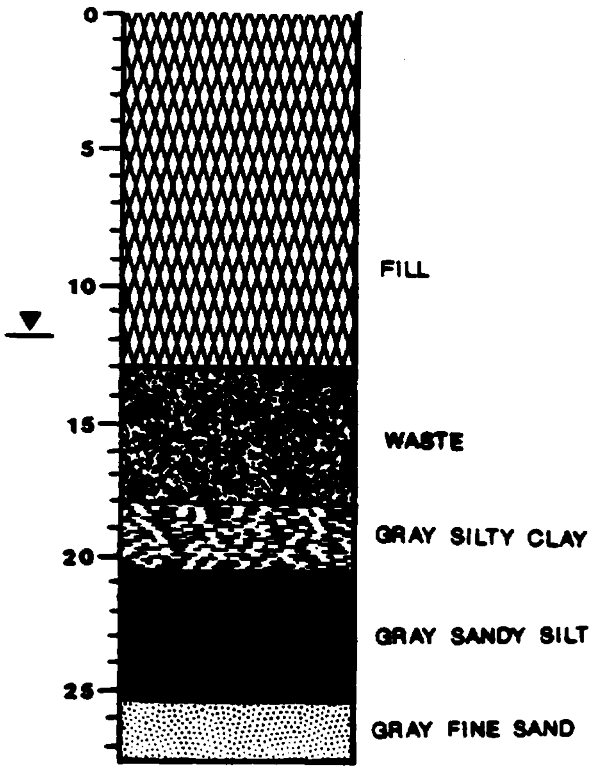
Site Dead Creek Site-H — Boring/Well No. H-4 cont.

Sample Depth	Blow Count	Description
31 - 32.5	3-5-7	Firm brown fine grain SAND. Trace of medium grain sand. Well sorted and well rounded. Some gray staining @ 31'-31.5'.
33.5 - 35	6-7-13	Firm gray very silty fine grain SAND. Some black banding @ 34 to 35'. Wet.
36 - 37.5	8-12-18	Dense gray fine grain SAND. Well rounded and well sorted. Wet.
38.5 - 40	9-14-20	Dense gray fine grain SAND; little silt. Well sorted and well rounded. Wet. 2-inch poorly sorted fine to coarse grain SAND. Seam @ 39.5'. Trace of small gravel.
41 - 42.5	9-12-16	Dense gray fine to coarse grain SAND. Well rounded. Wet.
43.5 - 45	8-9-10	Firm gray fine grain SAND. Wet.
46 - 47.5	9-12-14	Same as above.
48.5 - 50	14-17-25	Same as above.
		E.O.B. @ 50'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-7-87
Prepared by Kevin Phillips

Depth (ft) Description

H-5



Boring/Well No. H-5
Location Site H
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/7 & 1/7/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 27.5 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.

REMARKS

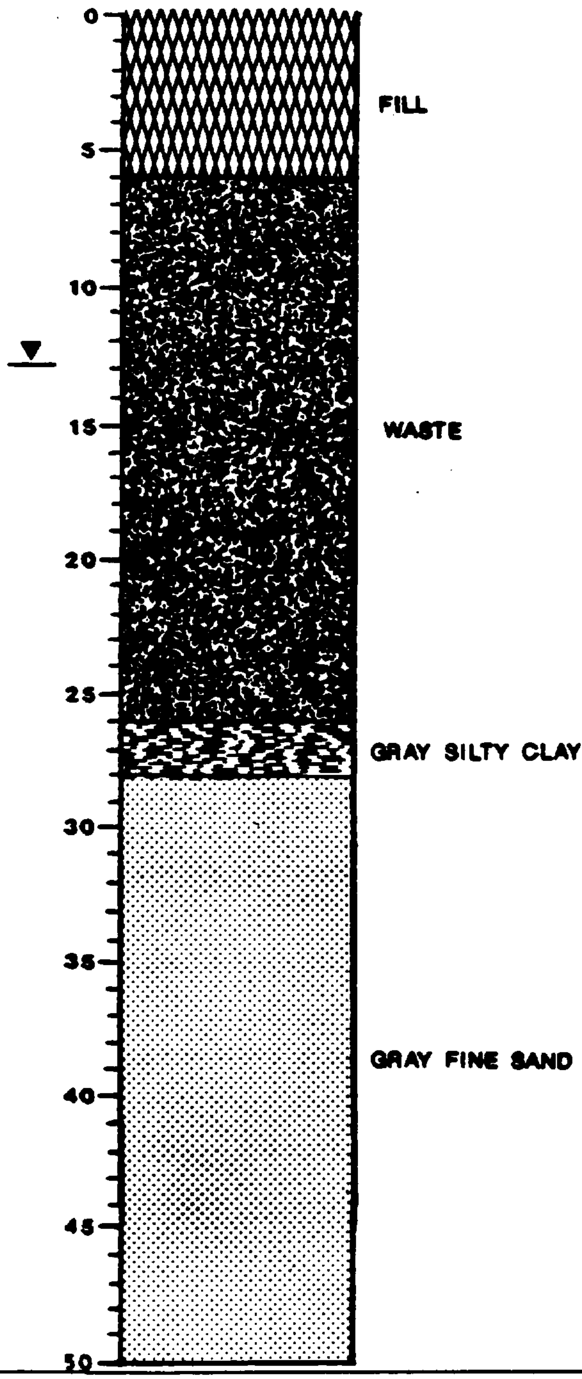
Ground elev. 409.75

Site Dead Creek Site-H | Boring/Well No. H-5

Sample Depth	Blow Count	Description
1 - 2.5	5-9-14	FILL consisting of brown silty CLAY including cinders, medium grain sand, and brick fragments. Dry.
3.5 - 5	3-4-6	FILL consisting of firm gray clayey SILT. Trace of small gravel and fine grain sand. Moist.
6 - 7.5	1-3-3	FILL same as above. Mottled with black silt. Moist.
8.5 - 10	7-8-10	FILL black cinders and small to medium gravel. Dry.
11 - 12.5	1-5-4	FILL same as above. (water @ approx. 12')
13.5 - 15	9-17-20	WASTE consisting of various debris materials, rubber, paper, and cloth products.
16 - 17.5	6-4-1	No recovery - probably same as above. Fill discontinues @ approx. 18'.
18.5 - 20	1-2-1	Soft gray very silty CLAY. Little fine grain sand. Moist.
21 - 22.5	2-1-4	Loose gray very sandy SILT. Some fine grain sand. Wet.
23.5 - 25	3-2-3	Same as above.
26 - 27.5	1-1-2	Loose gray fine grain SAND. Trace of silt. Well sorted. Wet.
		E.O.B. @ 27.5'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-7-87
Prepared by Kevin Phillips

Depth (ft) H - 6 Description



Boring/Well No. H-6
Location Site H
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/7 & 1/7/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers and rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 50.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 35 - 50' analyzed for HSL compounds.

REMARKS

Ground elev. 408.19

Site Dead Creek Site-E Boring/Well No. M-6

Sample Depth	Blow Count	Description
1 - 2.5	6-14-5	FILL 0-1.5 Black cinders, coarse grain sand and small gravel. 1.5-2.5 Brown silty CLAY. Some small gravel, black cinders, and brick fragments.
3.5 - 5	5-7-10	FILL consisting of dark brown coarse grain SAND and small gravel. Dry.
6 - 7.5	5-9-5	WASTE consisting of black-brown clayey SAND. Some small to large gravel. Also includes a black flaky substance. Moist.
8.5 10	11-16-12	WASTE 8.5-9.5 Black oil or tar-like stained sludge including a black flaky substance as above. 9.5-10 Brown and black coarse grain SAND and small gravel. Some black flaky material as above.
11 - 12.5	4-3-2	WASTE 11-11.5 Yellowish-brown chunky waste. Very moist. 11.5-12.5 Coarse grain SAND and small gravel. Stained black with viscous liquid. Very moist.
		Water @ 13'.
13.5 - 15	5-4-3	WASTE consisting of sand and gravel with various debris materials including paper and cloth products and black stained wood chips.
16 - 17.5	3-2-2	WASTE same as above.
18.5 - 20	2-1-3	WASTE consisting of brown-black stained sludge including small hard spherical beads (~1/8" dia.) and wood chips. Wet.
21 - 22.5	1-1-4	WASTE consisting of dark gray sludge with a soft and sticky red substance throughout; (turns hexane green).
23.5 - 25	3-3-5	WASTE same as above; with small spherical beads and more red substance. Fill discontinues @ approx. 26'.
26 - 27.5	1-1-1	Soft gray very silty CLAY. Black stains and streaks. Wet.
28.5 - 30	2-4-7	Firm gray fine grain SAND. Well rounded and sorted. Top 6 inches stained dark gray. Wet.

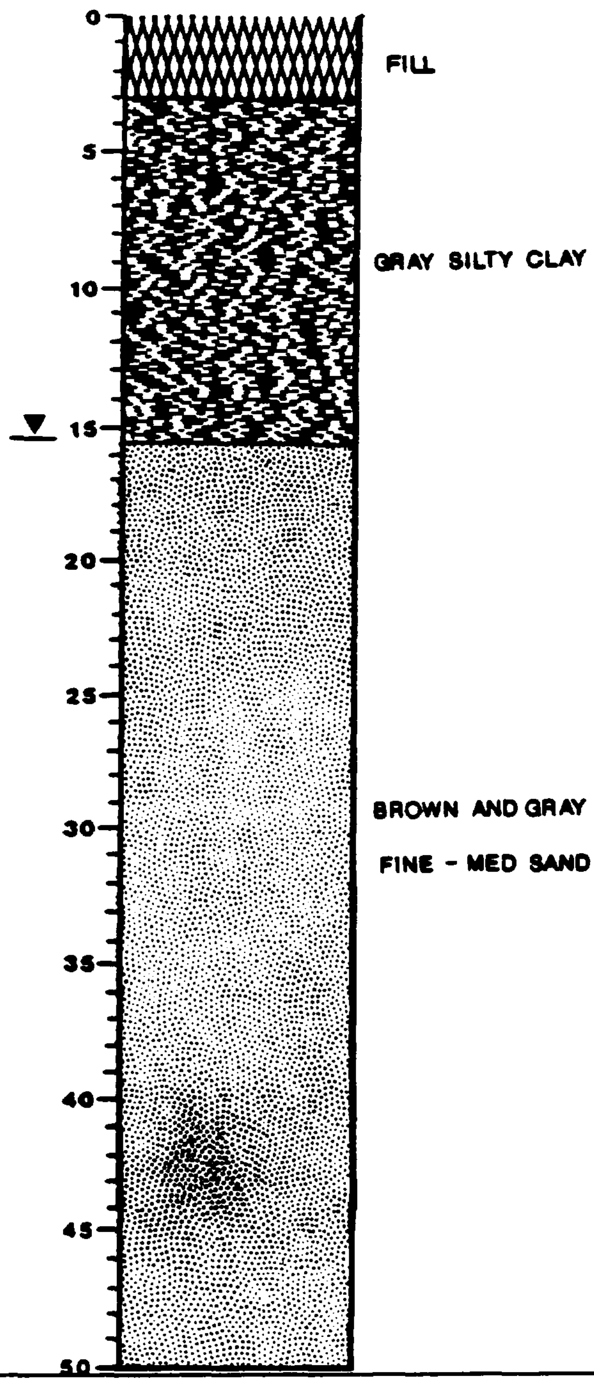
Site Dead Creek Site-N | Boring/Well No. N-6 cont.

Sample Depth	Blow Count	Description
5 foot sample interval from 30'.		
33.5 - 35	9-12-18	Same as above.
38.5 - 40	12-20-24	Gray very dense fine to coarse grain SAND. Wet.
43.5 - 45	15-22-28	Light gray very dense fine grain SAND. Trace of silt. Well sorted. Wet.
48.5 - 50	10-10-17	Same as above.
		E.O.B. @ 50'.

Project Name: Dead Creek
Project No.: IL 3140
Date Prepared: 1-8-87
Prepared by: Kevin Phillips

Depth (ft) — Description

H-7



Boring/Well No.: H-7
Location: Site H
Owner: IEPA
Top of Inner Casing Elev.: NA
Drilling Firm: Fox drilling
Driller: Jerry Hammon
Start & Completion Dates: 1/8 & 1/8/87
Type of Rig: Mobile B-61

Method of Drilling: 3 3/4" I.D. hollow stem augers, Rotary

WELL DATA

Hole Diam.: 8 in.
Boring Depth: 50.0 ft.
Casing and Screen Diam.:
Screen Interval:
Screen Type:
Stickup:
Well Type:
Well Construction:
- Filter Pack:
- Seal:
- Grout:
- Lock No.:

TEST DATA

Static Water Elev.: ______ Date: ______
Static Water Elev.: ______ Date: ______
Slug Test: Yes ____ No ____
Test Date:
Hydraulic Conductivity:
Other:

WATER QUALITY

Samples Taken: Yes ____ No X
No. of Samples:
Types of Samples:

Date Sampled:
Samplers:
Samples Analyzed for:

Split Samples: Yes ____ No X
Recipient:

Comments: No subsurface soil samples analyzed.

REMARKS

Ground elev. 410.66

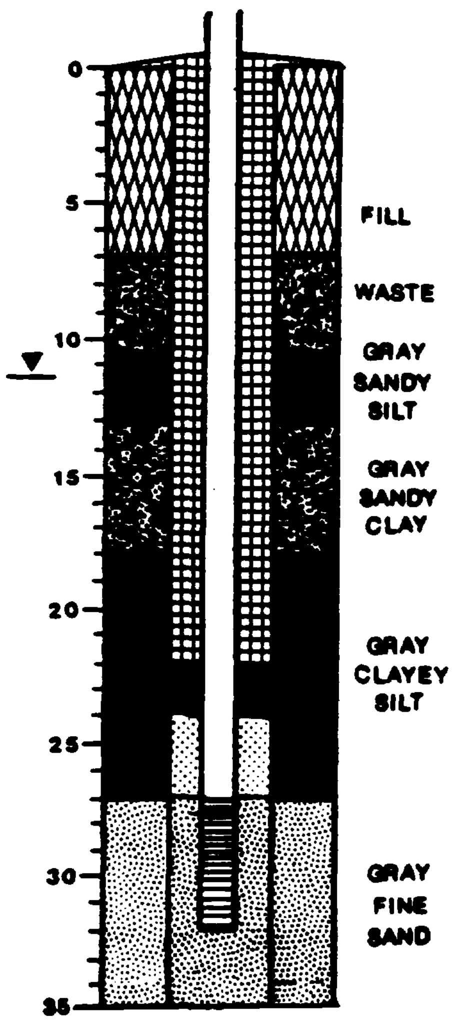
Site Dead Creek Site-H Boring/Well No. H-7

Sample Depth	Blow Count	Description
1 - 2.5	12-14-16	FILL consisting of black silty CLAY with crushed limestone and brick fragments. Dry. Fill discontinues @ approx. 3'.
3.5 - 5	2-4-5	Gray stiff very silty CLAY. Trace of fine grain sand. Moist. Chemical odor.
6 - 7.5	3-2-3	Same as above. Some black and dark gray staining. Gasoline odor.
8.5 - 10	3-4-6	Same as above. No staining. Slight odor.
11 - 12.5	2-3-4	Brown and gray (mottled) firm very silty CLAY. Occasional silt stringers. Moist. No odor.
13.5 - 15	3-3-4	Same as above. Water @ 15.5'.
16 - 17.5	1-1-2	Brownish-gray loose fine grain SAND. Some silt. Occasional iron stained pockets. Wet.
18.5 - 20	1-1-5	Brown loose fine to medium grain SAND. Trace of silt. Well sorted and rounded. Wet. Start sampling interval @ 20'.
23.5 - 25	3-8-14	Reddish-brown dense coarse grain SAND. Trace of small gravel. Some fine to medium grain sand. Poorly sorted and well rounded. Black stained sand seam (2") @ 24.5'. Wet.
28.5 - 30	7-9-13	Grayish-brown dense fine to medium grain SAND. Well rounded and sorted. Wet.
33.5 - 35	12-12-14	Brown dense fine grain SAND. Trace of medium grain sand. Well sorted and rounded. Wet.
38.5 - 40	8-12-20	Gray very dense fine grain SAND. Occasional natural organic layers. Wet.
43.5 - 45	18-25-30	Natural wood. (apparently drill and sample a buried tree @ 43')
48.5 - 50	7-9-7	Gray firm fine to coarse grain SAND. Rounded, wet.
		E.O.B. @ 50'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-12-87
Prepared by Kevin Phillips

Depth (ft) Description

EE-03



Boring/Well No. H-8/EE-03
Location Site H
Owner IEPA
Top of Inner Casing Elev. 411.47
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/9 & 1/12/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 35.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 27 - 32 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.36
Well Type monitoring
Well Construction:
- Filter Pack 32 - 24 ft.
- Seal 24 - 22 ft.
- Grout 22 ft. to surface
- Lock No. 2834

TEST DATA

Static Water Elev. 394.74 Date 3-26-87
Static Water Elev. 398.72 Date 5-11-87
Slug Test Yes X No
Test Date 5-11-87
Hydraulic Conductivity 10×10^{-3} cm/sec
Other pH = 7.3
Cond. = 2800 umhos Temp. = 56° F
Yellowish

WATER QUALITY

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-17-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.

REMARKS

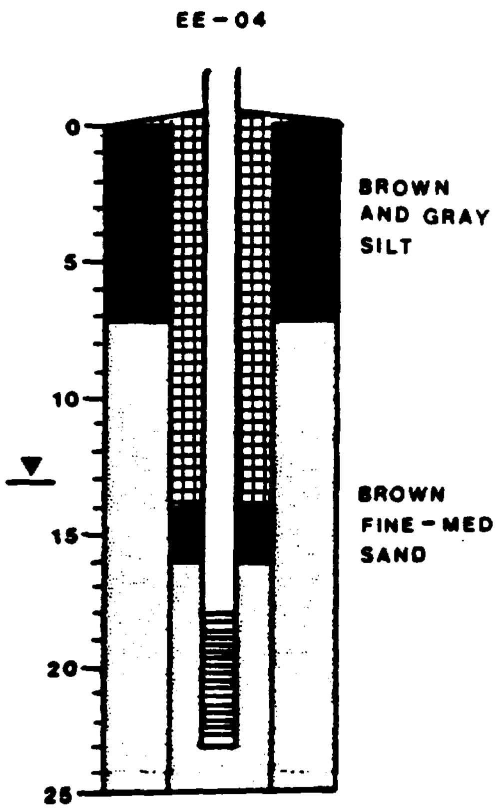
Slight organic odor

Site Dead Creek Site-H | Boring/Well No. H-8/well #EE-03

Sample Depth	Blow Count	Description
		0-1.5 Black cinders
1 - 2.5	4-5-7	1.5-2.5 Brown and gray silty CLAY. Trace of small gravel, brick, and concrete fragments.
3.5 - 5	4-5-1	FILL same as above.
6 - 7.5	8-12-11	FILL consisting of black and gray silty CLAY (possibly stained). 2 inches of black granular material and small spherical beads @ 7'. WASTE (moist)
8.5 - 10	30/2	WASTE - no recovery (rod bounced, probably rubber material).
		Water @ 11' while drilling.
11 - 12.5	1-1-1	Gray very sandy SILT. Some fine grain sand. Wet. Slight chemical odor.
13.5 - 15	2-3-5	Gray firm very sandy silty CLAY. Some fine grain sand and silt. Horizontally bedded and slightly varved. Occasional fractures containing iron-like staining. Moist.
16 - 17.5	1-2-3	Same as above; bedding is 1/8" to 1/4" thick. Occasional fractures and root trails or burrows.
18.5 - 20	1-1-1	Gray loose very clayey SILT, some fine grain sand. No bedding. Wet.
21 - 22.5	1-2-3	Same as above; slightly bedded (1/8") and slightly varved.
23.5 - 25	1-1-1	Same as above.
26 - 27.5	3-4-7	Same as above. (Fine grain sand in tip of spoon).
28.5 - 30	6-6-10	From 27' dark gray fine grain SAND. Wet. Slight chemical odor.
33.5 -35	3-9-9	Firm gray fine to coarse grain SAND. Wet. Well rounded.
		E.O.B. @ 35'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-13-87
Prepared by Kevin Phillips

Depth (ft) Description



Boring/Well No. H-9/EE-04
Location Site H
Owner IEPA
Top of Inner Casing Elev. 413.26
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/13, 1/13/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 25 ft.
Casing and Screen Diam. 2 in.
Screen Interval 18 - 23 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.93 ft.
Well Type monitoring
Well Construction:
- Filter Pack 23 - 16 ft.
- Seal 16 - 14 ft.
- Grout 14 ft. to surface
- Lock No. 2834

TEST DATA

Static Water Elev. 398.07 Date 3-26-87
Static Water Elev. 399.01 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity 5.2 x 10^{-4} cm/sec
Other pH = 7.2
Cond. = 2000 umhos Temp. = 58° F
Clear-yellow

WATER QUALITY

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-17-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes No X
Recipient

Comments Subsurface soil sample from boring from 15 - 25' analyzed for HSL organics

REMARKS

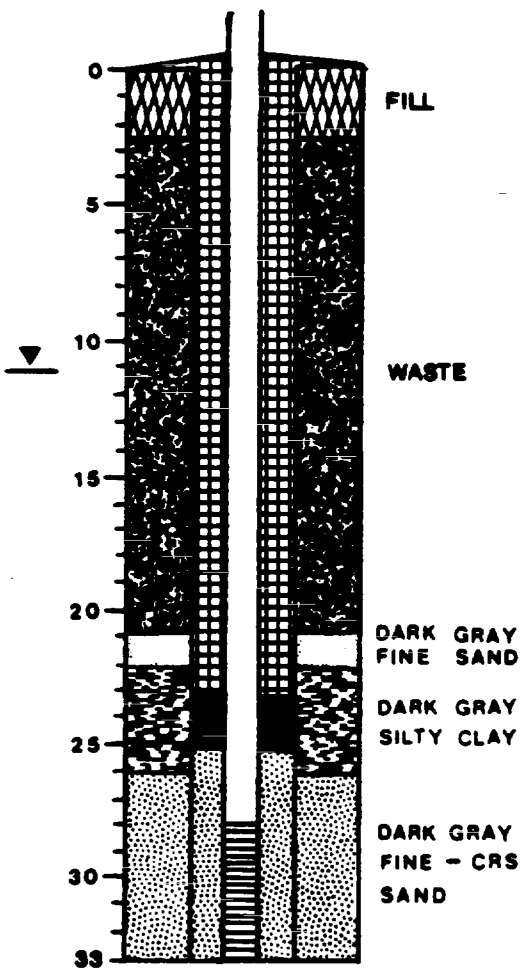
Site Dead Creek Site-N   Boring/Well No. N-9/well #EE-04

Sample Depth	Blow Count	Description
1 - 2.5	5-5-3	0-2' Firm brownish-gray clayey SILT. Trace of fine grain sand. Moist. 2-2.5' Firm brown sandy SILT. Some fine grain sand. Dry.
3.5 - 5	3-4-6	Stiff brown and gray (mottled) very silty CLAY. Trace of fine grain sand. Occasional clayey silt layers (2"). Moist.
6 - 7.5	3-5-8	Same as above; becomes increasingly siltier at 7' then grades into brown very fine SAND at 7 1/4'. Trace of silt. Dry.
8.5 - 10	3-5-7	Brown very fine grain SAND. Trace of silt. Dry.
11 - 12.5	2-2-5	Same as above; a 4 inch silty clay layer appears at 12'. Trace of fine grain sand.
13.5 - 15	2-6-8	Brown fine grain SAND. Wet.
16 - 17.5	2-6-7	Brown fine grain SAND. Some medium grain sand. Wet.
18.5 - 20	1-1-3	Brown medium grain SAND. Trace of coarse grain sand. Wet.
23.5 - 25	7-14-11	Brown medium grain SAND. Trace of coarse grain sand and small gravel. Wet.
		E.O.B. @ 25'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-28-87
Prepared by Tim Maley

Depth (ft) Description

EE-12



Boring/Well No. I-1/EE-12
Location Site I
Owner IEPA
Top of Inner Casing Elev. 409.16
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/27-1/28/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 33.5 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 0.52 ft.
Well Type monitoring
Well Construction:
Filter Pack 33 - 25 ft. Natural
Seal 25 - 23 ft.
Grout 23 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 397.43 Date 3-26-87
Static Water Elev. 398.65 Date 5-11-87
Slug Test Yes ___ No X
Test Date
Hydraulic Conductivity
Other pH = 7.4
Cond. = 3200 umhos Temp. = 58° F

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-23-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ___
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.

REMARKS

Duplicate of DC-GW-24

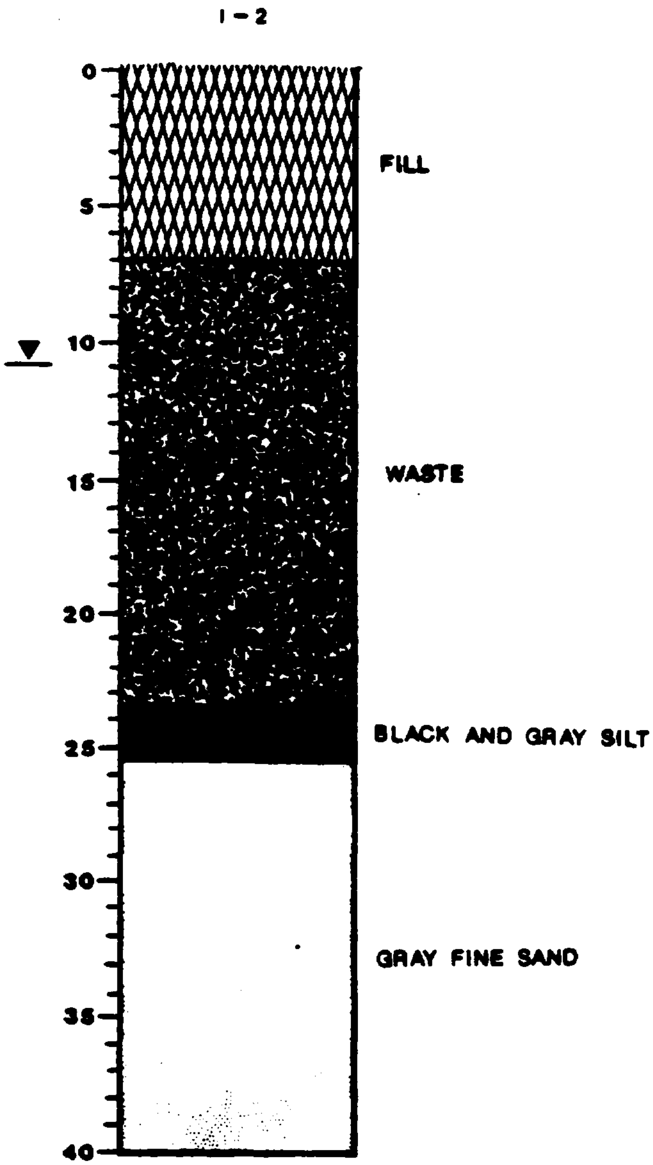
Site Dead Creek Site-I

Boring/Well No. I-1/Well # EE-12

Sample Depth	Blow Count	Description
		Crushed limestone and gravel on surface - parking lot for semi-trailers.
1 - 2.5	5-6-7	FILL consisting of brown-black sandy CLAY including a mixture of asphalt, fine to coarse grain sand, large gravel, and slag. Dry.
3.5 - 5	3-4-6	WASTE consisting of brown-black gravelly SAND including slag, stained paper and wood products, and a white gravelly substance. Dry.
6 - 7.5	3-5-4	WASTE. Same as above; with more slag and small spherical beads. Dry.
8.5 - 10	7-2-1	WASTE - poor recovery; probably same as above.
11 - 12.5	4-2-1	WASTE - same as above; wet.
13.5 - 15	7-10-14	WASTE consisting of black (oily stained) sludge-like material including wood chips, coarse grain sand, and concrete fragments. Wet.
16 - 17.5	1-3-4	WASTE. Same as above; with brick and concrete fragments, sand and gravel, and soft clay. Wet.
18.5 - 20	4-3-1	WASTE. Same as above. Fill material discontinues @ 21'.
21 - 22.5	0-0-2	21-22' Dark gray fine grain SAND. Some black staining. Wet. 22-22.5 Dark gray silty CLAY. Moist.
23.5 - 25	2-2-2	Dark gray silty CLAY. Moist.
26 - 27.5	0-0-1	Dark gray to black fine grain SAND. Trace of silt and medium grain SAND. Wet.
28.5 - 30	6-8-10	Dark gray medium to coarse grain SAND. Wet.
31 - 32.5	7-8-9	Same as above; with a trace of small gravel. Wet.
		E.O.B. @ 33.5"

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-28-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. I-2
Location Site I
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/28, 1/28/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers and rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 40 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples(soil) Yes X No
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 5 - 25' analyzed for HSL compounds.

REMARKS

Ground elev. 409.98

(7) and (8) are corrected to
(13) 760 mm of Hg (29.92 in. of Hg)
(14) 25°C (77°F)

CALIBRATION WORK SHEET

(1) Run Point No.	(2) Elapsed Time - Δt Min.	(3) Initial Volume V_m M^3	(4) Meter Inlet Static Pressure - ΔP in. of Hg	(5) Standard Volume V_{STD} M^3	(6) Calibrator Orifice Static Press. ΔH in. of H_2O	(7) Flow Rate Q_{STD} M^3/min.	(8) Flow Rate Q_{STD} ft^3/min.	For application see ref. 1 $\sqrt{\Delta H \left(\frac{P_1}{P_{STD}}\right)\left(\frac{536.58}{T_1}\right)}$
1	6.994	1	0.2	1.012	2.0	0.145	5.1	
2	4.178	1	0.4	1.005	5.5	0.241	8.5	
3	3.356	1	0.6	0.998	8.5	0.297	10.5	
4	2.865	1	0.8	0.991	11.5	0.346	12.2	
5	2.538	1	1.0	0.984	14.5	0.388	13.7	
6								
7								

(9) P_1: 29.76 in. of Hg

(10) T_1= 64 °F + 459.58 = °R

R H: 54 %

Roots Meter No.: 7509364

Calibrator Orifice:
Model No.: GMW-40
Serial No.: 45-C

Calibration performed by: Pedro Verdugo

Date of Calibration: 12/10/86

Date placed in service:
(To be noted by user)

EQUATIONS

$$V_{STD} = V_m \frac{(P_1 - \Delta P)}{P_{STD}} \frac{T_{STD}}{T_1}$$

$$= (3) \frac{(9) - (4)}{(13)} \frac{(14)}{(10)}$$

$$Q_{STD} = \frac{V_{STD}}{\Delta t} = \frac{(5)}{(2)}$$

$M^3 \times 35.31 = Ft^3$

For additional information consult:
1. The Federal Register, Vol. 47, No. 234, pp. 54896-54921, December 6, 1982

Notes: 1. EPA recommends calibrators should be recalibrated after one year of field use.
2. Copies of this calibration are not kept on file.

CALIBRATOR ORIFICE for HIGH VOLUME AIR SAMPLER

CERTIFICATE of CALIBRATION

SERIAL NO. 45-C

GENERAL METAL WORKS INC.
8368 BRIDGETOWN ROAD / VILLAGE OF CLEVES, OHIO 45002 / TEL. 513-941-2229

141610
continued

High Volume Sampler
Calibration Data

APPENDIX C

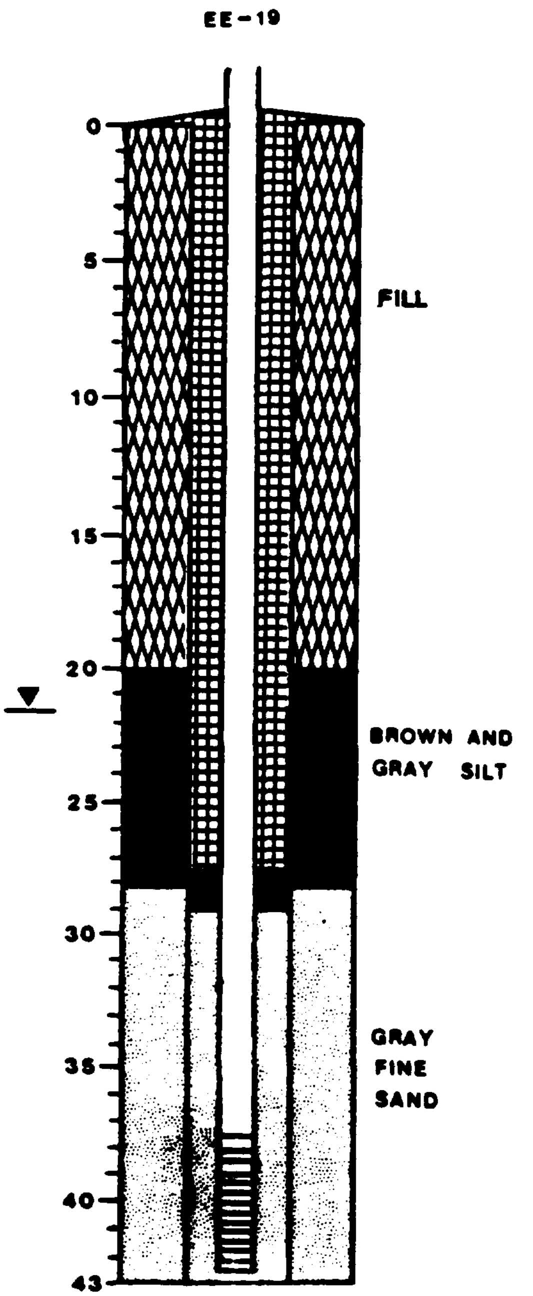
AIR SAMPLING FLOW VOLUME CALCULATIONS AND CALIBRATION DATA

Site Dead Creek Site-Q   Boring/Well No. Q-8/Well #EE-19

Sample Depth	Blow Count	Description
		Spent coal coke in piles on surface.
		Straight drill to 30'.
		Stratigraphy sequence based on auger cuttings.
		0-20 FILL consisting of black cinders, slag gravel, and fine to coarse grain sand. Dry. Fill probably discontinues @ approx. 20'.
		20-28.5 Brown-gray SILT. Trace of clay.
28.5 - 30	8-12-15	Gray very fine grain SAND. Trace of silt.
33.5 - 35	8-13-18	Same as above. Trace of coarse grain sand.
38.5 - 40	7-10-14	Same as above.
		E.O.B. @ 43'.

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-10-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. Q-8/EE-19
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 423.22
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/10,2/10/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 43 ft.
Casing and Screen Diam. 2 in.
Screen Interval 37.5 - 42.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.1 ft.
Well Type monitoring
Well Construction:
- Filter Pack 42.5 - 29 ft. Natural
- Seal 29 - 27.5 ft.
- Grout 27.5 ft. to surface
- Lock No. 2834

TEST DATA

Static Water Elev. 399.27 Date 3-26-87
Static Water Elev. 403.24 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other Duplicate of DC-GW-07

WATER QUALITY

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-16-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes ____ No X
Recipient

Comments

REMARKS

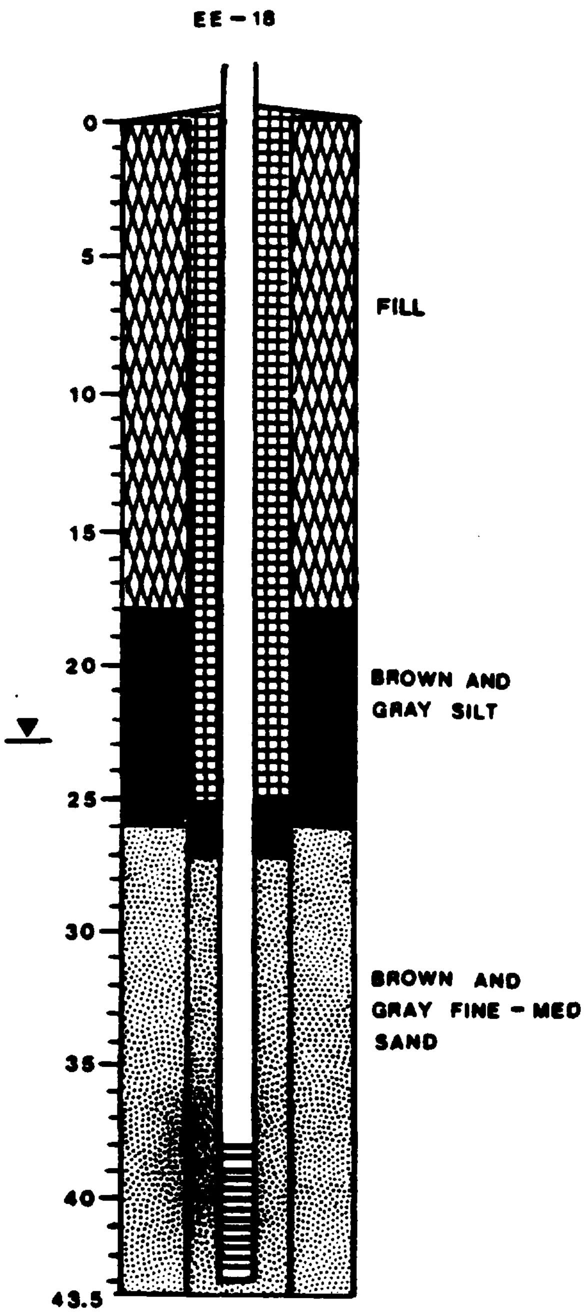
Site Dead Creek Site-Q

Boring/Well No. Q-7/Well #EE-18

Sample Depth	Blow Count	Description
		Black cinder fill on surface.
		Straight drill to 20'.
		Stratigraphy sequence based on auger cuttings.
		0-18' FILL consisting of black clayey SAND with some black cinders, slag material, plastic and paper products, and wood chips.
18.5 - 20	10-17-24	Dark brown - dark gray SILT. Trace of very fine grain sand. Moist. Rust color and oil-like staining. Laminated.
23.5 - 25	4-4-5	Same as above.
28.5 - 30	3-5-8	Brown fine to medium grain SAND. Wet.
33.5 - 35	4-6-10	Same as above.
38.5 - 40	3-5-10	Becomes gray. Same as above. Trace of coarse grain sand.
		E.O.B. @ 43.5'.

Project Name Dead Creek
Project No. IL 3140
Date Prepared 3-9-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. Q-7/EE-18
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 419.54
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/9/87,2/9/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 43.5 ft.
Casing and Screen Diam. 2 in.
Screen Interval 38 - 43 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.34 ft.
Well Type monitoring
Well Construction:
Filter Pack 43 - 27 ft. Natural
Seal 27 - 25 ft.
Grout 25 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 395.10 Date 3-26-87
Static Water Elev. 396.26 Date 5-11-87
Slug Test Yes ___ No X
Test Date
Hydraulic Conductivity
Other High oil content, strong odor

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples groundwater

Date Sampled
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes ___ No X
Recipient

Comments

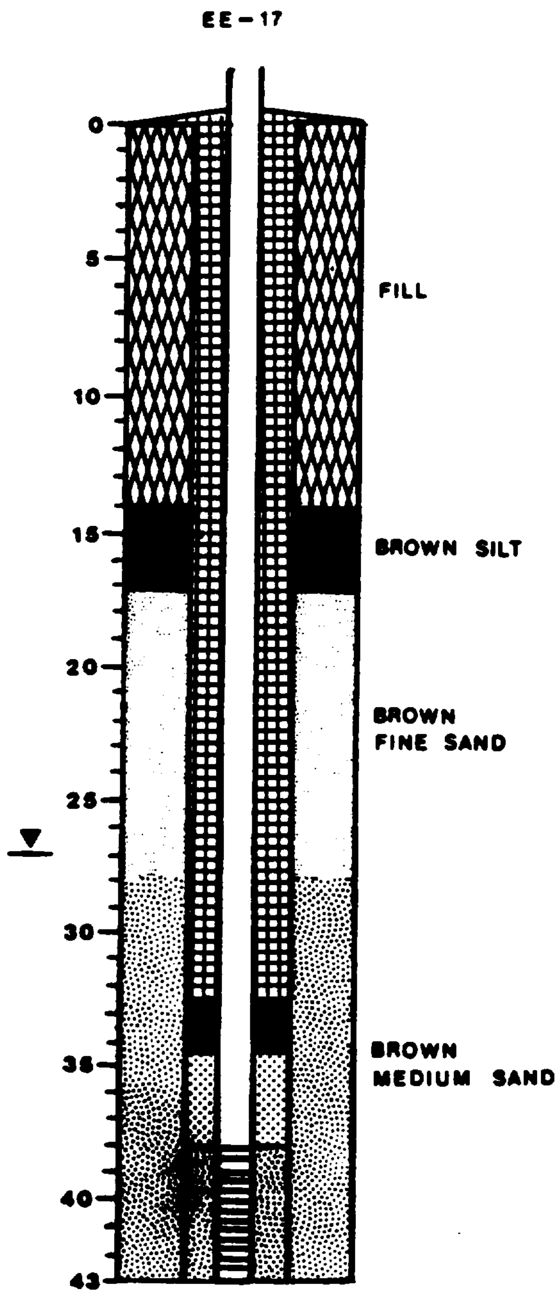
REMARKS

Site Dead Creek Site-Q   Boring/Well No. Q-6/Well #EE-17

Sample Depth	Blow Count	Description
		Well vegetated fill on surface.
1 - 2.5	5-6-6	FILL consists of brown silty CLAY. Trace of fine grain sand.
3.5 - 5	3-3-5	FILL consisting of dark brown silty CLAY and brown fine grain sand. Layered. Dry.
6 - 7.5	12-20-22	FILL consisting of brown very fine grain SAND. Some silt. Dry.
8.5 - 10	13-20-40	FILL consisting of brown silty clay and fine grain sand. Trace of coarse grain sand and brick fragments.
11 - 12.5	6-9-5	FILL consisting of brown medium to coarse grain SAND. Trace of small to large gravel and crushed limestone. Dry. Fill discontinues @ 14'.
13.5 - 15	4-4-5	Brown SILT. Trace of very fine grain sand. Dry.
18.5 - 20	4-4-7	Light brown fine grain SAND. Dry.
23.5 - 25	9-18-20	Same as above.
28.5 - 30	10-15-19	Light brown medium grain SAND. Trace of coarse grain sand and small gravel. Wet @ 30'.
33.5 - 35	11-14-20	Same as above.
38.5 - 40	12-14-16	Same as above.
		E.O.B. @ 43'.

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-6-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. Q-6/EE-17
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 423.06
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/6/87,2/6/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D.
hollow stem augers and rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 43 ft.
Casing and Screen Diam. 2 in.
Screen Interval 38 - 43 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.06 ft.
Well Type monitoring
Well Construction:
Filter Pack 43 - 34.5 ft.
Seal 34.5 - 32.5 ft.
Grout 32.5 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 394.97 Date 3-26-87
Static Water Elev. 396.26 Date 5-11-87
Slug Test Yes ___ No X
Test Date
Hydraulic Conductivity
Other pH = 7.0
Cond. = 1500 umhos Temp. = 56° F

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-16-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes ___ No X
Recipient

Comments

REMARKS

Background location

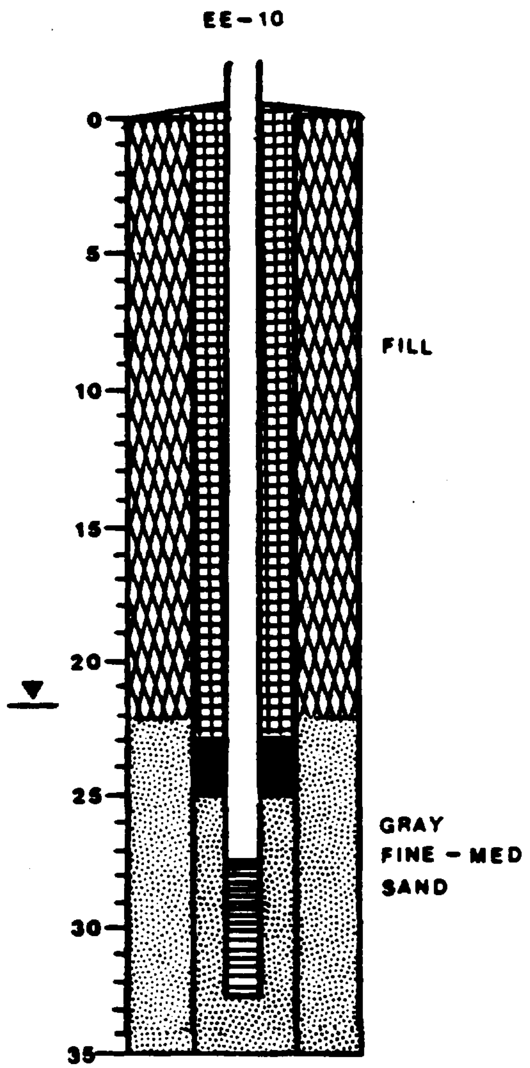
Site Dead Creek Site-Q

Boring/Well No. Q-5/Well #EE-10

Sample Depth	Blow Count	Description
		FILL materials on surface.
3.5 - 5	3-37-7	FILL consisting of black clayey sand with some black cinders, fly ash, wood chips, and fine to coarse grain sand. Dry.
8.5 - 10	2-4-2	Same as above.
13.5 - 15	NA	No recovery. Possible rubber tire.
18.5 - 20	NA	No recovery - fill apparently discontinues @ 22'.
23.5 - 25	NA	No recovery.
28.5 - 30	4-4-4	Gray fine to medium grain SAND. Wet.
33.5 - 35	22-20-22	Same as above.
		E.O.B. @ 35'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-22-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. Q-5/EE-10
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 419.40
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/22-1/22/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 35 ft.
Casing and Screen Diam. 2 in.
Screen Interval 27.5 - 32.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.3 ft.
Well Type monitoring
Well Construction:
Filter Pack 32.5 - 25 ft.
Seal 25 - 23 ft.
Grout 6 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 395.37 Date 3-26-87
Static Water Elev. 395.44 Date 5-11-87
Slug Test Yes ___ No X
Test Date
Hydraulic Conductivity
Other pH = 6.8
cond. = 3800 umhos Temp. = 60° F
turbid

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-16-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes ___ No X
Recipient

Comments Strong hydrocarbon odor

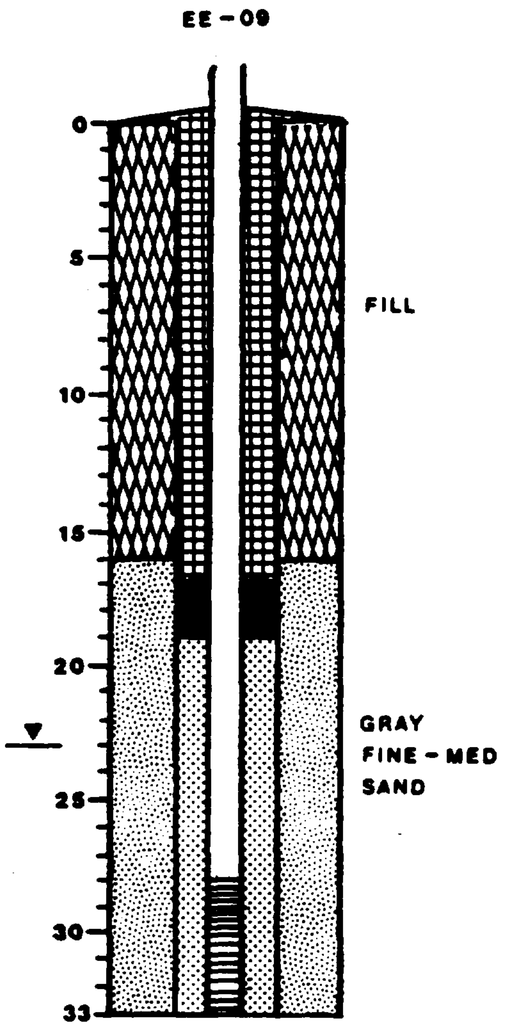
REMARKS

Site Dead Creek Site-Q Boring/Well No. Q-4/Well #EE-09

Sample Depth	Blow Count	Description
		Brown-black silty CLAY FILL on surface. Trace of paper products and sand.
3.5 - 5	6-7-1	No recovery - FILL
8.5 - 10	7-17-12	FILL consisting of brown-black SILTY CLAY with some slag gravel, brick fragments, and broken glass.
13.5 - 15	1-0-1	FILL - same as above. Mostly black cinders, slag gravel, sand, and silt. Fill discontinues @ approx. 16'.
18.5 - 20	9-14-17	Gray to dark gray fine to medium grain SAND. Moist.
23.5 - 25	1-2-5	Same as above. Wet.
28.5 - 30	2-3-12	Same as above.
		E.O.B. @ 33'.

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-21-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. Q-4/EE-09
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 415.40
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/21-1/21/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 33 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.02 ft.
Well Type monitoring
Well Construction:
Filter Pack 33 - 19 ft. Natural
Seal 19 - 17 ft.
Grout 17 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 395.24 Date 3-26-87
Static Water Elev. 395.83 Date 5-11-87
Slug Test Yes X No
Test Date 5-13-87
Hydraulic Conductivity 6.90 x 10⁻⁴ cm/sec
Other pH = 5.8
Cond. = 1700 umhos Temp. = 62° F

WATER QUALITY

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-16-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes No
Recipient

Comments

REMARKS

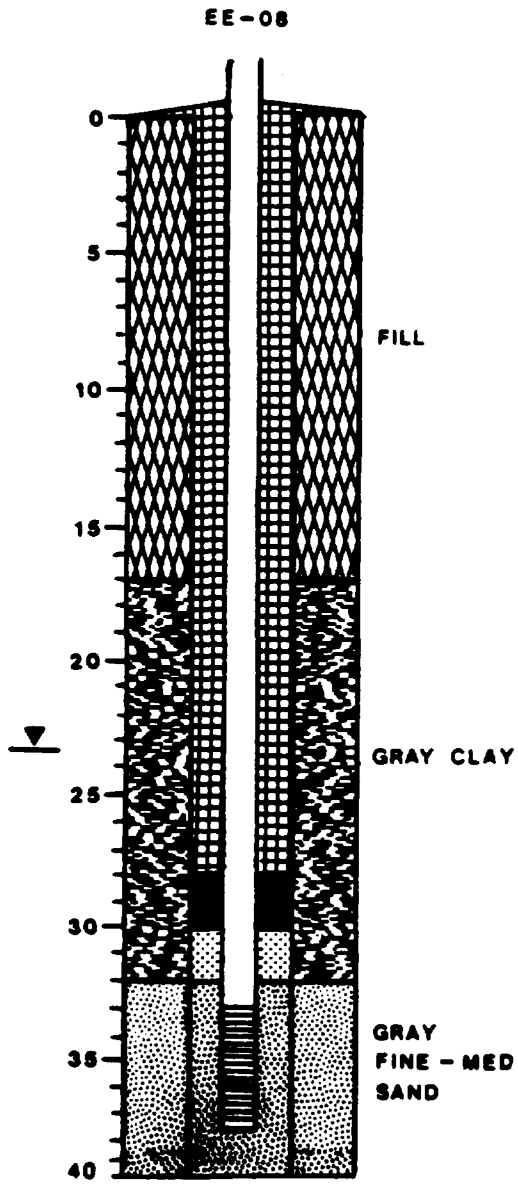
Site Dead Creek Site-Q

Boring/Well No. Q-3/Well #EE-08

Sample Depth	Blow Count	Description
		Brown-black-gray silty clay FILL on surface.
3.5 - 5	1-1-2	FILL consisting of black SILT. Trace of fine grain sand and black cinders. Thinnly laminated and crumbly.
8.5 - 10	1-0-1	Same as above. Moist at 9'.
13.5 - 15	1-0-0	Same as above. Wet. Fill apparently discontinues @ approx. 17'.
18.5 - 20	2-3-4	Dark gray silty CLAY. Dry.
23.5 - 25	2-3-7	Same as above. Some mottleness. Moist at 25'.
28.5 - 30	2-2-4	Same as above.
33.5 - 35	3-6-13	Gray fine to medium grain SAND. Wet.
38.5 - 40	8-20-30	Same as above.
		E.O.B. @ 40'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-21-87
Prepared by Tim Maley

Description



Boring/Well No. Q-3/EE-08
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 421.14
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/21-1/21/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 40 ft.
Casing and Screen Diam. 2 in.
Screen Interval 33 - 38 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.56 ft.
Well Type monitoring
Well Construction:
- Filter Pack 38 - 30 ft.
- Seal 30 - 28 ft.
- Grout 28-26 ft and 8 ft to surface
- Lock No. 2834

TEST DATA

Static Water Elev. 395.78 Date 3-26-87
Static Water Elev. 392.92 Date 5-11-87
Slug Test Yes X No ___
Test Date 5-13-87
Hydraulic Conductivity 1.06×10^{-4} cm/sec
Other

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-16-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes ___ No X
Recipient

Comments

REMARKS

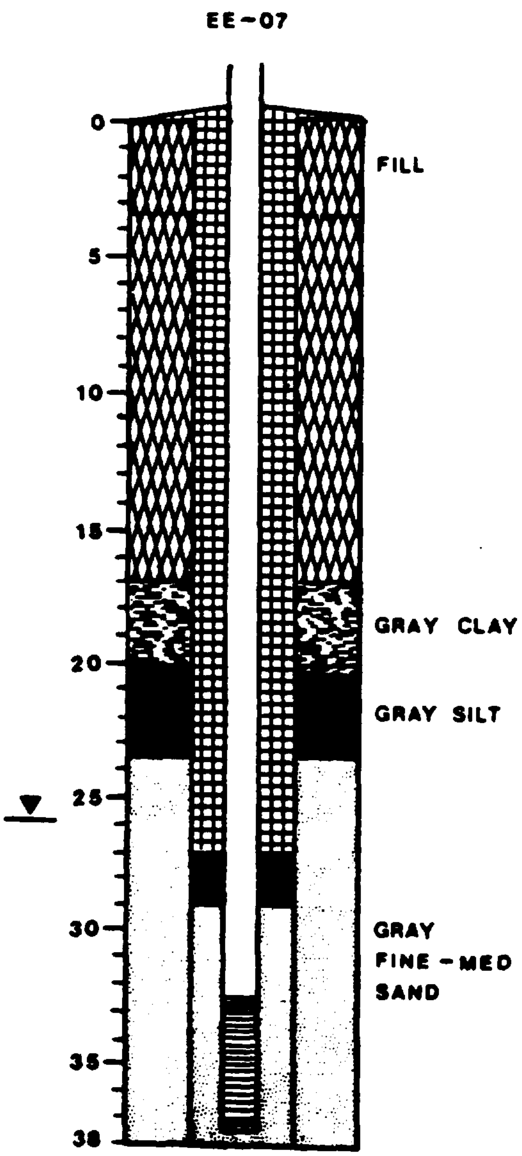
Site Dead Creek Site-Q

Boring/Well No. Q-2/Well #EE-07

Sample Depth	Blow Count	Description
		Black sandy CLAY with gravel and cinders. Fill on surface.
3.5 - 5	NA	FILL - spoon refusal (possible rubber tire)
8.5 - 10	NA	No recovery.
13.5 - 15	33-10-8	FILL - poor recovery. Appears to be various debris including paper products. Fill discontinues @ approx. 17'.
18.5 - 20	5-8-13	Gray silty CLAY. Trace of very fine grain sand. Dry.
23.5 - 25	3-4-3	Gray silt. Trace of very fine grain sand. Moist.
28.5 - 30	5-10-13	Gray fine grain SAND. Moist.
33.5 - 35	6-6-13	Gray fine to medium grain SAND. Wet.
36 - 37.5	-	Same as above.
		E.O.B. @ 38'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-20-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. Q-2/EE-07
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 423.31
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/20-1/20/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 38 ft.
Casing and Screen Diam. 2 in.
Screen Interval 32.5 - 37.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.66 ft.
Well Type monitoring
Well Construction:
Filter Pack 37.5 - 29 ft. Natural
Seal 29 - 27 ft.
Grout 6 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 395.48 Date 3-26-87
Static Water Elev. 394.72 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity 0.95×10^{-4} cm/sec
Other

WATER QUALITY

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-16-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes No X
Recipient

Comments

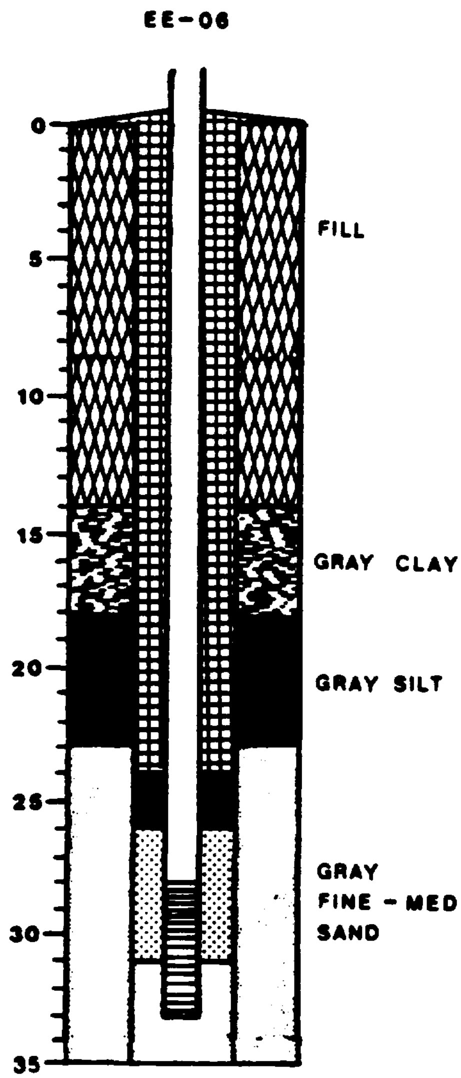
REMARKS

Site Dead Creek Site-Q Boring/Well No. Q-1/Well #EE-06

Sample Depth	Blow Count	Description
		Black cinder fill on surface
1 - 2.5	9-20-22	FILL consisting of black-gray silty clay with asphalt, cinders, sand, and gravel. Dry.
3.5 - 5	8-15-12	FILL - same as above.
6 - 7.5	5-9-3	FILL - same as above. Some wood chips.
8.5 - 10	3-6-2	FILL - same as above. With increased amount of debris including traces of rope, paper products, wood chips, and black stained sand.
11 - 12.5	1-3-13	FILL - same as above.
13.5 - 15	4-3-2	FILL - same as above. Fill discontinues @ approx. 14' then dark gray silty CLAY. Moist.
16 - 17.5	3-5-7	Gray silty CLAY. Moist.
18/5 - 20	2-4-4	Gray sandy SILT. Trace of very fine grain sand. Dry.
21 - 22.5	5-5-9	Same as above.
23.5 - 25	1-2-2	Dark gray very fine grain SAND. Some silt. Wet.
26 - 27.5	3-7-11	Light gray fine grain SAND. Trace of silt.
28.5 - 30	5-6-6	Gray SILT. Trace of very fine sand. Wet
31 - 32.5	3-8-11	Same as above. More fine grain sand. Wet.
33.5 - 35	1-3-6	Same as above.
		E.O.B. @ 35'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-19-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. Q-1/EE-06
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 423.51
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/19-1/19/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 35 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.3 ft.
Well Type monitoring
Well Construction:
Filter Pack 33 - 26 ft.
Seal 26 - 24 ft.
Grout 5 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 395.53 Date 3-26-87
Static Water Elev. 394.42 Date 5-11-87
Slug Test Yes X No
Test Date 5-11-87
Hydraulic Conductivity 2.2 x 10 cm/sec
Other pH = 7.0
Cond. = 4400 umhos Temp. = 56° F
Yellowish, turbid

WATER QUALITY

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-16-87
Samplers E & E
Samples Analysed for HSL compounds

Split Samples Yes No X
Recipient

Comments

REMARKS

Slight odor

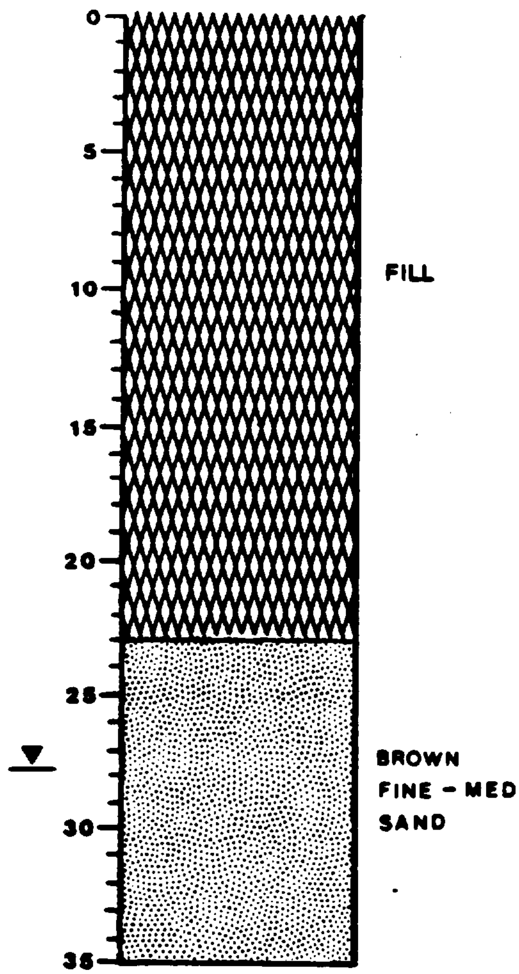
Site Dead Creek Site-P Boring/Well No. P-5

Sample Depth	Blow Count	Description
		Grass field area on surface.
1 - 2.5	4-5-7	FILL consisting of loose brown-black silty clay with crushed limestone, brick fragments, sand, and small gravel. Dry.
3.5 - 5	4-3-4	FILL - same as above with slag and cinder material.
6 - 7.5	1-2-1	FILL - same as above.
8.5 - 10	1-1-2	FILL consisting of brown-red silty clay. Mottled. Some medium grain sand and small gravel.
11 - 12.5	2-2-2	FILL consisting of brown silty CLAY.
13.5 - 15	1-1-2	FILL - same as above.
16 - 17.5	1-1-1	FILL consisting of brown silty CLAY. Trace of fine grain sand. Moist.
18.5 - 20	1-1-4	FILL - same as above. Trace of small gravel and asphalt.
21 - 22.5	1-2-3	FILL - same as above. Mottled.
		Fill discontinues @ approx. 23'.
23.5 - 25	2-4-7	Light brown fine to medium SAND. Dry.
26 - 27.5	2-4-6	Light brown fine to medium grain SAND. Trace of silt. Dry.
28.5 - 30	2-4-5	Brown fine grain SAND. Wet.
31 - 32.5	6-7-8	Same as above.. Trace of coarse grain sand. Wet.
33.5 - 35	7-11-13	Same as above. Trace of coarse grain sand and small gravel. Wet.
		E.O.B. @ 35'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-12-87
Prepared by Tim Maley

Depth (ft) Description

P-5



Boring/Well No. P-5
Location Site P
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/12, 2/12/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 35.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient
Comments Subsurface soil samples from boring 10 - 25' analyzed for HSL compounds.

REMARKS

Slight organic odor

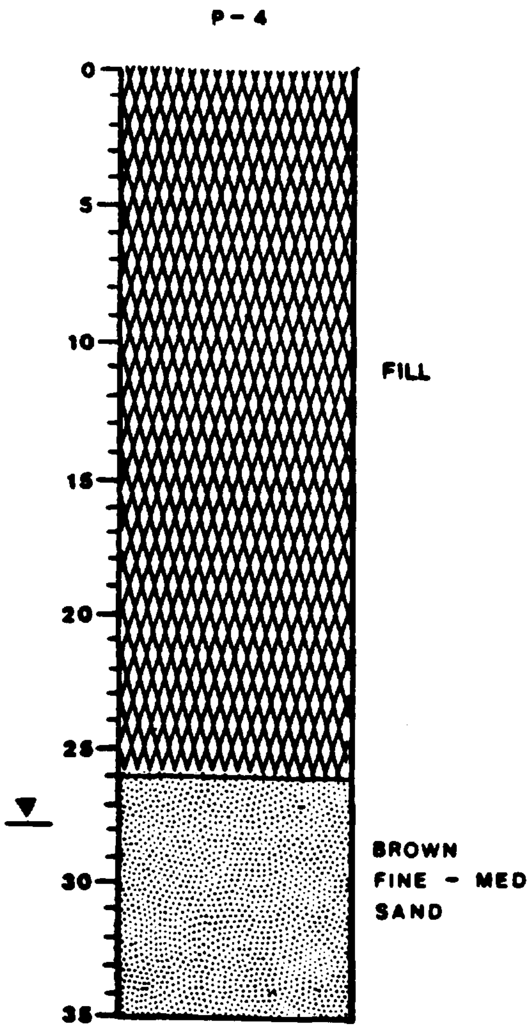
Ground elev. 422.98

Site Dead Creek Site-P   Boring/Well No. P-4

Sample Depth	Blow Count	Description
		Fill material on surface.
1 - 2.5	3-3-5	FILL consisting of dark brown-black silty clay; some crushed limestone, small gravel, and fine to medium grain sand.
3.5 - 5	4-9-8	FILL - same as above with more debris material including paper products and wood chips.
6 - 7.5	3-4-6	FILL - same as above.
8.5 - 10	5-7-22	FILL - same as above.
11 - 12.5	6-7-7	FILL - poor recovery.
13.5 - 15	2-9-5	No recovery.
16 - 17.5	7-14-19	FILL consisting of brown silty CLAY. Some medium-coarse grain sand and small gravel. Trace of a pale yellow solid (hard and brittle) substance. Dry.
18.5 - 20	2-10-2	FILL - same as above. Trace of paper products and wood chips.
21 - 22.5	13-27-17	FILL - same as above with additional debris including asphalt, slag, crushed limestone, wire, and gravel.
23.5 - 25	4-6-8	FILL - same as above.
		Fill discontinues at approx. 26'.
26 - 27.5	3-4-4	Brown fine grain SAND. Trace of silt. Moist.
28.5 - 30	5-10-10	Same as above. Wet.
31 - 32.5	3-6-10	Brown fine to medium grain SAND. Wet.
33.5 - 35	5-10-13	Same as above. Trace of coarse grain sand. Wet.
		E.O.B. @ 35'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-12-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. P-4
Location Site P
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/12, 2/12/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 35.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 0 - 10' and 25 - 35' analyzed for HSL compounds.

REMARKS

Slight organic odor.

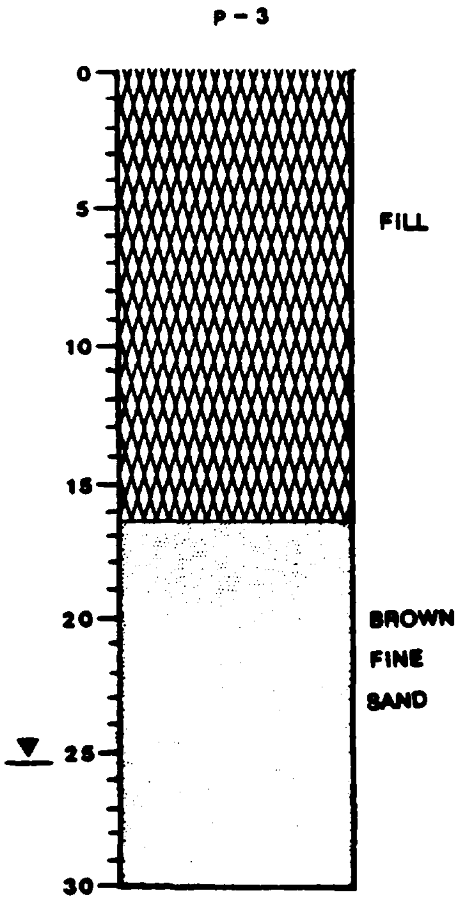
Ground elev. 424.65

Site Dead Creek Site-P Boring/Well No. P-3

Sample Depth	Blow Count	Description
		Black cinder fill on surface.
1 - 2.5	7-9-12	FILL consisting of black and brown sandy clay with various debris material including paper products, wood chips, cloth, tin, rubber, slag, cinders, crushed limestone, an off-white crystalline substance, hay, and fine to coarse grain sand. Dry.
3.5 - 5	3-3-30/6	FILL - same as above.
6 - 7.5	3-3-6	FILL - same as above.
8.5 - 10	6-18-33	FILL - same as above.
11 - 12.5	12-12-13	FILL - poor recovery. Strong moth ball (naphalene) odor.
13.5 - 15	5-7-15	No recovery.
16 - 17.5	6-17-17	FILL - same as above.
		Fill discontinues @ approx. 16.5'.
		Gray silty very fine grain SAND. Dry.
18.5 - 20	5-7-9	Brown fine grain SAND. Dry.
21 - 22.5	4-6-9	Same as above.
23.5 - 25	3-3-5	Same as above. Moist.
26 - 27.5	4-10-8	Same as above. Wet.
28.5 - 30	5-9-11	Same as above. Wet.
		E.O.B. @ 30'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-11-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. P-3
Location Site P
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/11, 2/11/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 30.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments

REMARKS

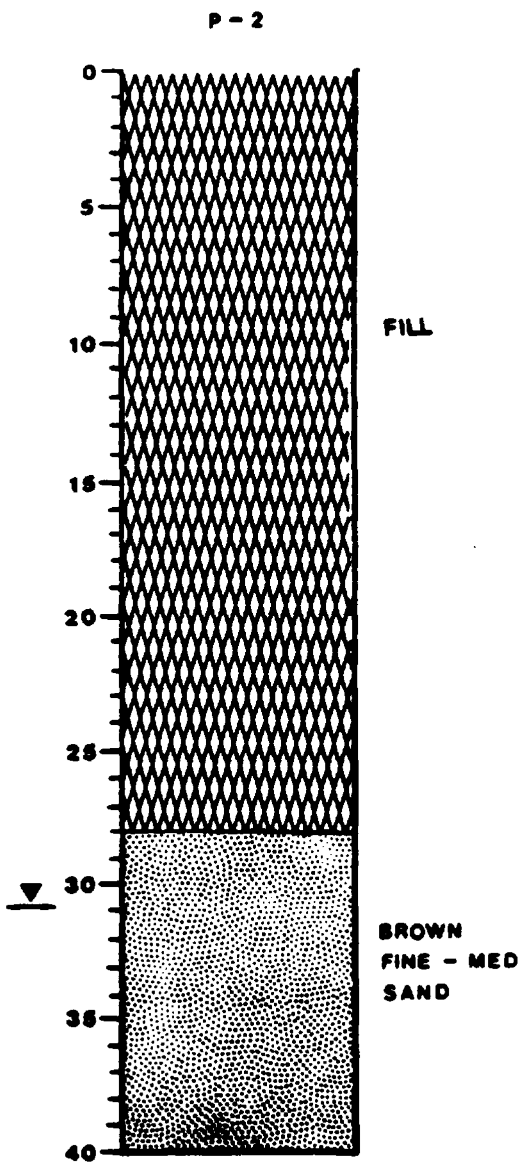
Ground elev. 419.36

Site Dead Creek Site-P Boring/Well No. P-2

Sample Depth	Blow Count	Description
		Crushed limestone on surface.
1 - 2.5	6-6-7	FILL consisting of black-brown sandy CLAY with various debris including paper and plastic products, wood chips, slag, small gravel, fine to coarse grain sands, and brick fragments. Dry.
3.5 - 5	3-3-7	Same as above.
6 - 7.5	3-4-4	Same as above.
8.5 - 10	2-6-6	Same as above.
11 - 12.5	5-5-7	Same as above.
13.5 - 15	7-7-8	Same as above.
16 - 17.5	4-3-14	Same as above. Moist.
18.5 - 20	6-6-8	Same as above.
21 - 22.5	6 - 50/3	Same as above. Spoon refusal.
23.5 - 25	10-6-28	Same as above. Poor recovery.
26 - 27.5	3-5-5	No recovery. Probably same as above.
		FILL apparently discontinues @ 28'.
28.5 - 30	6-9-12	Dark gray fine to medium grain SAND. Moist.
33.5 - 35	7-11-10	Brown medium grain SAND. Wet.
38.5 - 40	7-12-14	Dense brown fine to medium SAND. Wet.
		E.O.B. @ 40'.

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-11-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. P-2
Location Site P
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/11, 2/11/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 40.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments

REMARKS

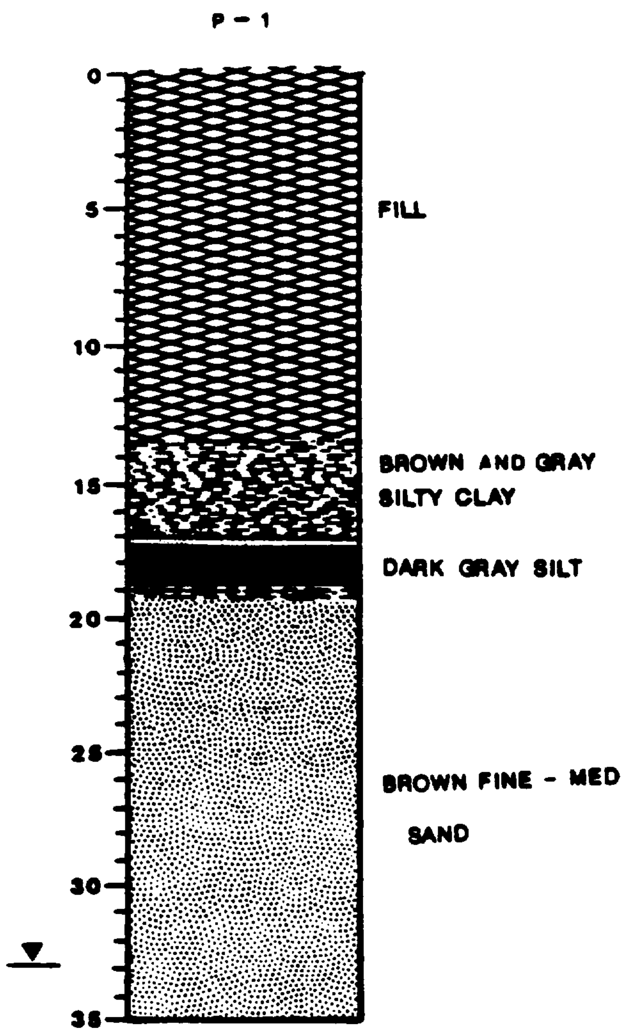
Ground elev. 423.62

Site Dead Creek Site-P   Boring/Well No. P-1

Sample Depth	Blow Count	Description
		Crushed limestone on surface.
1 - 2.5	4-3-3	FILL consisting of black sandy CLAY with crushed limestone, slag gravel, coal, and cinders.
3.5 - 5	4-3-3	Same as above.
6 - 7.5	5-7-25/3	FILL consisting of various debris including paper and plastic products, slag gravel, asphalt, and silty clay. Large obstruction encountered @ 7.5'.
8.5 - 10	6-12-10	FILL consisting of brown silty CLAY with various debris including paper products, small gravel, and fine to coarse grain sand. Wet.
11 - 12.5	6-17-3	Same as above.
		FILL discontinues @ 13.5'
13.5 - 15	3-6-7	Dark brown-dark gray silty CLAY. Slightly mottled. Trace of very fine grain sand. Dry.
16 - 17.5	2-4-6	Same as above to 17'. 4" layer of gray fine grain sand @ 17-17 1/3'. Dry. Then dark gray SILT. Trace of very fine grain sand. Dry.
18.5 - 20	3-5-8	Dark gray very fine grain SAND. Trace of silt. 2" gray silty clay layer @ 19'. Then light gray fine to medium grain SAND. Dry.
21 - 22.5	6-10-12	Brown medium grain SAND. Trace of coarse grain sand and small gravel. Dry.
23.5 - 25	6-13-12	Same as above.
28.5 - 30	2-5-7	Same as above.
33.5 - 35	3-5-10	Same as above. Wet.
		E.O.B. @ 35'.

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-11-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. P-1
Location Site P
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/11, 2/11/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 35.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 0 - 10' and 25 - 35' analyzed for HSL compounds.

REMARKS

Ground elev. 418.41

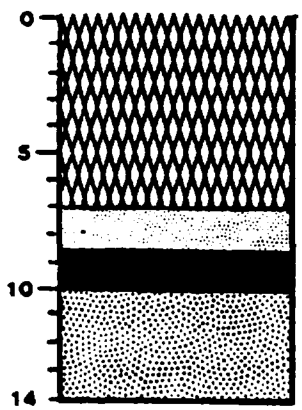
Site Dead Creek Site-O Boring/Well No. O-10

Sample Depth	Blow Count	Description
0 - 1	Hand auger	FILL consisting of red-brown sandy silty CLAY
1 - 3.5	Hand auger	FILL consisting of black cinder-like material. Dry.
3.5 - 5	Hand auger	FILL consisting of black cinders. Dry.
5 - 7	Hand auger	FILL consisting of black to greenish-black sludge-like material and soft silty clay. Wet. Fill discontinues @ 7'.
7 - 8.5	Hand auger	Greenish-gray fine grain SAND. Black staining throughout. Wet.
8.5 - 10	Hand auger	Greenish-gray very sandy SILT. Black staining. Very moist.
10 - 14	Hand auger	Light brown fine to medium grain SAND. Moist. No apparent staining.
		E.O.B. @ 14'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-26-87
Prepared by Kevin Phillips

Depth (ft) Description

O-10



Boring/Well No. O-10
Location Site O
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Kevin Phillips and Dan Sewall
Start & Completion Dates 2/26, 2/26/87
Type of Rig NA

Method of Drilling Hand auger

WELL DATA

Hole Diam. 4 in.
Boring Depth 14 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes ____ No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes X No ____
Recipient Geraghty & Miller for the Village of Sauget

Comments Subsurface soil samples from boring 5 - 10' and 10 - 15' analyzed for HSL compounds.

REMARKS

Strong organic odor

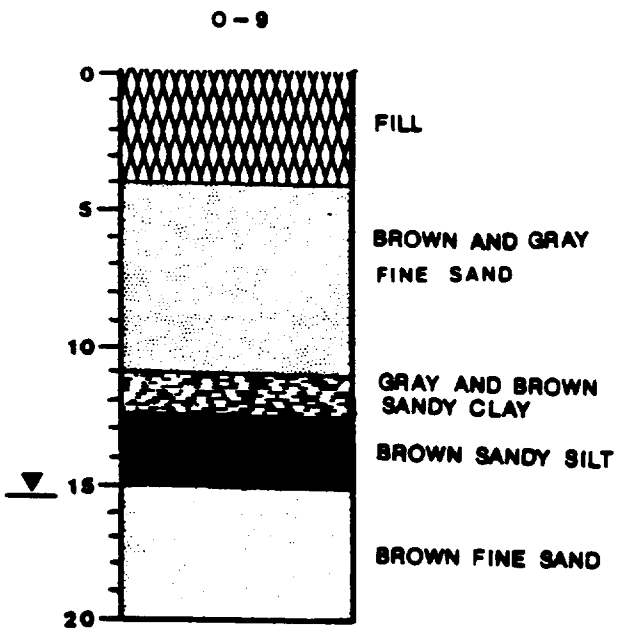
Ground elev. 408.68

Site Dead Creek Site-O Boring/Well No. O-9

Sample Depth	Blow Count	Description
	Hand auger	0-1 Red-brown silty CLAY (fill-cap material).
1 - 2.5	Hand auger	FILL consisting of red-brown mottled silty CLAY. Trace of fine grain sand and roots. Moist.
3.5 - 5	Hand auger	3.5-4' FILL consisting of grayish-brown silty CLAY. Trace of fine grain SAND. Trace of black hardened material throughout. Fill discontinues @ 4'. 4-5' Brownish-gray very silty fine grain SAND. Some silt. Moist.
6 - 7.5	Hand auger	Loose grayish-brown very silty fine grain SAND. Thin reddish or black-gray staining in horizontal layers.
8.5 - 10	Hand auger	Firm grayish-brown very silty fine grain SAND. Similiar stain as seen in sample above. Very moist. Oily sheen.
11 - 12.5	Hand auger	Grayish-brown sandy silty CLAY. Some silt. Little fine grain sand. Oily sheen in very moist layers.
13.5 - 15	Hand auger	Brown very sandy SILT. Some fine grain sand. 2" fine grain sand layer @ 14.5' stained red-orange. Black-gray stained layers throughout.
16 - 17.5	Hand auger	Brown very silty fine grain SAND. Wet.
18.5 - 20	Hand auger	Same as above. Oily sheen in water. E.O.B. @ 20'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-26-87
Prepared by Kevin Phillips

Depth (ft) Description



Boring/Well No. O-9
Location Site O
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Robby Crachy, Dan Sewall, Kevin Phillips
Start & Completion Dates 2/26, 2/26/87
Type of Rig NA

Method of Drilling Hand auger

WELL DATA

Hole Diam. 4 in.
Boring Depth 20.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes X No
Recipient Geraghty & Miller for the Village of Sauget

Comments Subsurface soil samples from boring 0 - 10' and 10 - 15' analyzed for HSL compounds.

REMARKS

Ground elev. 411.07

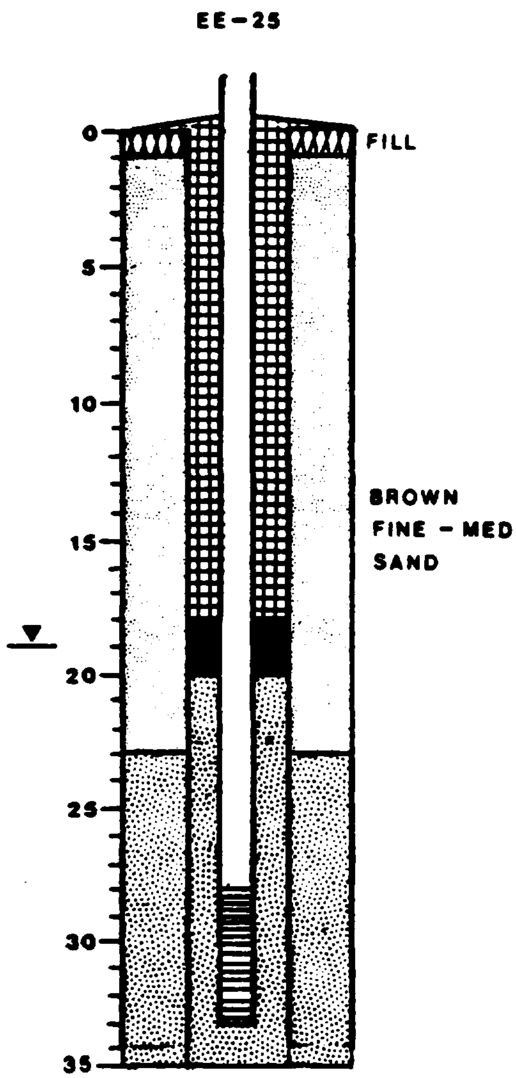
Site Dead Creek Site-O

Boring/Well No. O-8/Well #EE-25

Sample Depth	Blow Count	Description
		Crushed limestone surface. * Straight drill to 23.5 Approximate stratigraphy based on auger cuttings. 0.5'-1.0' Black silty CLAY. Fill. 1.0-20+' Brown fine grain SAND. Trace of silt. Water level while drilling ~19'.
23.5 - 25	11-16-15	Brown fine to medium grain SAND. Wet.
28.5 - 30	9-17-17	Brown-gray fine to medium SAND. Wet.
33.5 - 35	5-8-13	Brown medium grain SAND. Trace of coarse grain sand and small to medium gravel. E.O.B. @ 35'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-20-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. O-8/EE-25
Location Site O
Owner IEPA
Top of Inner Casing Elev. 411.25
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/20, 2/20/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 35 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.72 ft.
Well Type monitoring
Well Construction:
Filter Pack 33 - 20 ft. Natural
Seal 20 - 18 ft.
Grout 18 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 395.73 Date 3-26-87
Static Water Elev. 397.39 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity 16 x 10^{-3} cm/sec
Other pH =7.0
Cond. = 1400 umhos Temp. = 56° F
Cloudy, yellowish, slight odor

WATER QUALITY

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No
Recipient Geraghty & Miller for the Village of Sauget

Comments

REMARKS

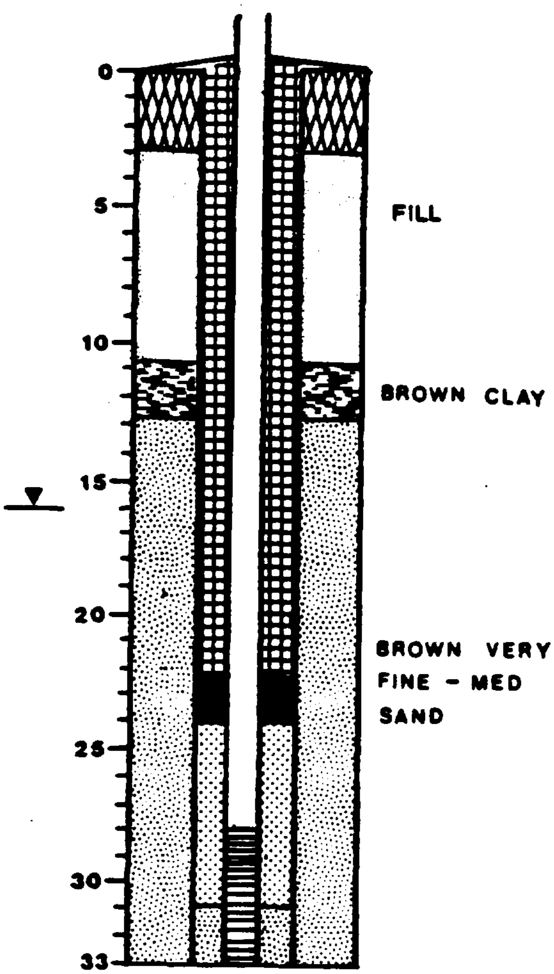
Site Dead Creek Site-O Boring/Well No. O-7/Well #EE-24

Sample Depth	Blow Count	Description
		Well vegetated clay cap.
1 - 2.5	23-22-22	FILL consisting of black silty CLAY. Some crushed limestone, gravel, fine to coarse grain sand, and silt.
		Fill discontinues @ 3'.
3.5 - 5	6-9-11	Brownish-gray fine grain SAND. Trace of silt. Dry.
6 - 7.5	4-4-4	Gray very fine grain SAND. Some silt. Dry.
8.5 - 10	6-7-7	Brown fine to medium grain SAND. Dry.
11 - 12.5	0-2-8	Brown-silty CLAY. Slightly mottled. Trace of fine grain sand. Moist.
13.5 - 15	6-7-9	Gray very fine grain SAND. Very moist.
16 - 17.5	7-8-10	Brown medium grain SAND. Trace of coarse grain sand and small to medium gravel. Wet.
18.5 - 20	3-2-3	Same as above.
21 - 22.5	3-4-13	Brown very fine grain SAND. Trace of silt. Wet.
23.5 - 25	11-15-25	Brown medium grain SAND. Trace of clay @ 24'. Trace of coarse sand and small gravel. Wet.
26 - 27.5	6-3-5	Same as above.
28.5 - 30	NA	Gray medium grain SAND. Wet.
		E.O.B. @ 33'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-19-87
Prepared by Tim Maley

Depth (ft) Description

EE-24



Boring/Well No. O-7/EE-24
Location Site O
Owner IEPA
Top of Inner Casing Elev. 411.00
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/19, 2/19/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 33.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 0.98 ft.
Well Type Monitoring
Well Construction:
Filter Pack 33 - 24 ft.
Seal 24 - 22.5 ft.
Grout 22.5 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 395.04 Date 3-26-87
Static Water Elev. 396.84 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity 0.65 x10[illegible]cm/sec
Other pH = 7.2
Cond. = 4200 umhos Temp. = 58° F
Very cloudy, yellowish, slight odor

WATER QUALITY

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analysed for HSL compounds

Split Samples Yes X No
Recipient Geraghty & Miller for the Village of Sauget

Comments

REMARKS

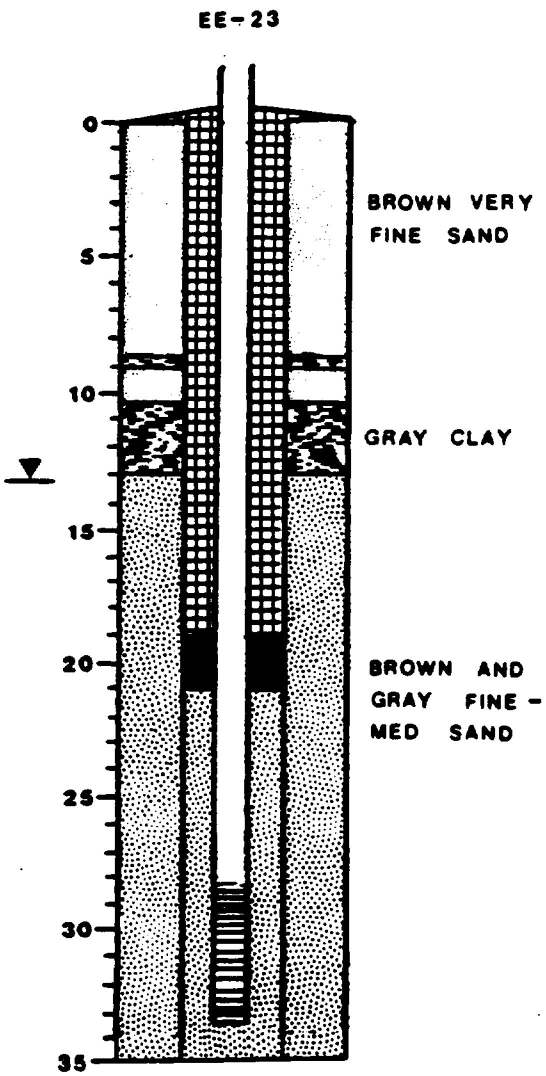
Site Dead Creek Site-O

Boring/Well No. O-6/Well #EE-23

Sample Depth	Blow Count	Description
1 - 2.5	1-2-1	Brown very fine grain SAND. Trace of silt. Dry.
3.5 - 5	1-2-1	Same as above.
6 - 7.5	2-3-2	Same as above. Increased amount of silt.
8.5 - 10	1-2-2	Same as above. Brown-gray silty CLAY layer @ 8.5-9'.
11 - 12.5	1-1-2	Soft gray silty CLAY. Trace of very fine grain sand. Moist.
13.5 - 15	1-1-3	Brown fine to medium grain SAND. Wet.
16 - 17.5	2-6-10	Brown very fine grain SAND. Trace of silt. Wet. Two thin gray silty clay layers (-1") @ 16 3/4'.
18.5 - 20	2-6-10	Brown fine to medium grain SAND. Wet.
21 - 22.5	8-3-14	Brown medium grain SAND. Trace of coarse grain sand and small gravel. Wet.
23.5 - 25	4-7-10	Same as above.
26 - 27.5	4-8-16	Gray fine to medium grain SAND. Trace of small gravel. Wet.
28.5 - 30	4-6-9	Same as above.
33.5 - 35	5-7-11	Same as above.
		E.O.B. @ 35'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-18-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. O-6/EE-23
Location Site O
Owner IEPA
Top of Inner Casing Elev. 410.67
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/18, 2/18/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 35.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28.5 - 33.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.58 ft.
Well Type Monitoring
Well Construction:
Filter Pack 33.5 - 21 ft. Natural
Seal 21 - 19 ft.
Grout 19 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 395.95 Date 3-26-87
Static Water Elev. 397.77 Date 5-11-87
Slug Test Yes ___ No X
Test Date
Hydraulic Conductivity
Other pH = 7.0
Cond. = 1300 umhos Temp. = 56° F
Cloudy, yellowish green, slight odor

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ___
Recipient Geraghty & Miller for the Village of Sauget

Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.

REMARKS

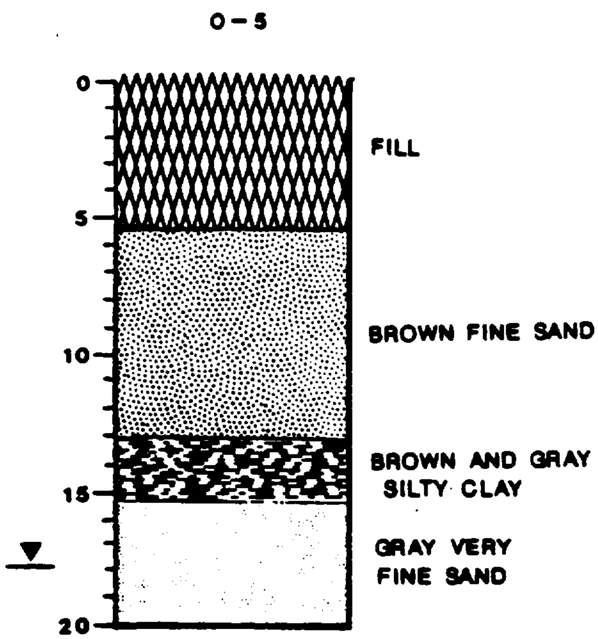
Site Dead Creek Site-O

Boring/Well No. O-5

Sample Depth	Blow Count	Description
		Well Vegetated clay cap.
1 - 2.5	1-2-2	FILL consisting of soft brown silty CLAY.
3.5 - 5	1-1-1	Same as above. Fill discontinues @ approx. 5.5'.
6 - 7.5	4-4-4	Brown very fine grain SAND. Some silt. Dry.
8.5 - 10	2-5-7	Brown fine grain SAND.
11 - 12.5	3-4-3	Same as above.
13.5 - 15	2-3-4	Brown-gray silty CLAY. Some interbedding of silty very fine grain sand. Dry.
16 - 17.5	2-2-2	Gray very fine grain SAND. Trace of silt. Moist @ 17'.
18.5 - 20	3-6-8	Same as above. Wet.
		E.O.B. @ 20'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-17-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. O-5
Location Site O
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/17, 2/17/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples(soil)Yes X No
Recipient Geraghty & Miller for the Village of Sauget

Comments Subsurface soil samples from boring 8.5 - 20' analyzed for HSL compounds.

REMARKS

Strong organic odor

Ground elev. 413.12

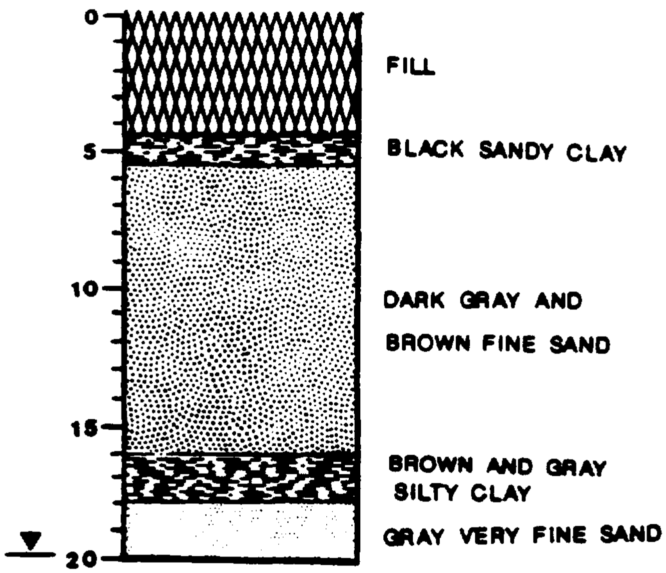
Site Dead Creek Site-O Boring/Well No. O-4

Sample Depth	Blow Count	Description
		Well vegetated clay cap.
1 - 2.5	1-2-2	FILL consisting of dense brown silty CLAY. Trace of fine grain sand.
3.5 - 5	6-3-4	Same as above to 4'. 4-5.5' Black clay-like sludge.
6 - 7.5	1-3-4	Dark greenish-gray very fine grain SAND. Trace of silt. Dry.
8.5 - 10	4-6-8	Dark brown very fine grain SAND. Trace of clay and silt in thin layers.
11 - 12.5	4-4-5	Light brown fine to medium grain SAND. Dry.
13.5 - 15	3-4-5	Brown very fine grain SAND. Trace of silt. Dry.
16 - 17.5	1-3-4	Brown-gray silty CLAY. Trace of very fine grain sand. Dry. Soft black silty clay layer @ 17 1/4' (~2")
18.5 - 20	6-6-7	Gray very fine grain SAND. Trace of silt and medium grain sand. Wet @ 20'.
		E.O.B. @ 20'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-17-87
Prepared by Tim Maley

Depth (ft) Description

O-4



Boring/Well No. O-4
Location Site O
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/17, 2/17/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples(soil)Yes X No
Recipient Geraghty & Miller for the Village of Sauget

Comments Subsurface soil samples from boring O - 10' analyzed for HSL compounds.

REMARKS

Strong organic odor

Ground elev. 412.62

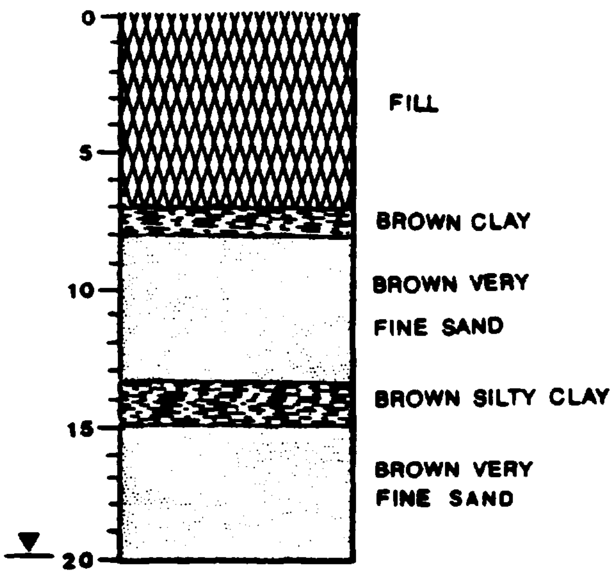
Site Dead Creek Site-O Boring/Well No. O-3

Sample Depth	Blow Count	Description
		Well vegetated clay cap.
1 - 2	5-5-7	FILL consisting of dense brown silty CLAY. Trace of very fine grain sand.
3.5 - 5	2-1-2	Same as above.
6 - 7.5	1-2-2	Same to 6.5' 6.5-8' Black sponge-like substance. Sludge. Fill discontinues @ approx. 8'.
8.5 - 10	3-6-7	Brown very fine grain SAND. Trace of silt. Dry.
11 - 12.5	3-2-3	Same as above.
13.5 - 15	3-2-3	Brown silty CLAY. Trace of very fine grain sand. Slightly mottled. Moist.
16 - 17.5	3-5-8	Brown silty very fine grain SAND. Dry.
18.5 - 20	7-7-7	Brown very fine grain SAND. Wet @ 20'.
		E.O.B. @ 20'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-17-87
Prepared by Tim Maley

Depth (ft) Description

O-3



Boring/Well No. O-3
Location Site O
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/17, 2/17/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples(soil) Yes X No
Recipient Geraghty & Miller for the Village of Sauget

Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.

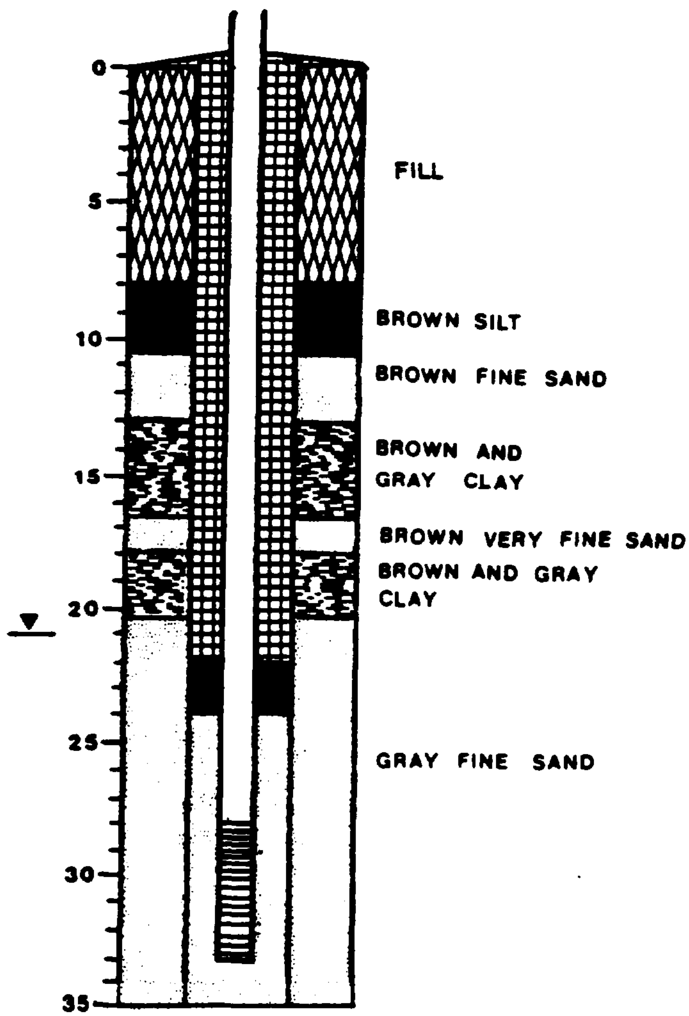
REMARKS

Ground elev. 414.16

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-17-87
Prepared by Tim Maley

Depth (ft) Description

EE-22



Boring/Well No. O-2/EE-22
Location Site O
Owner IEPA
Top of Inner Casing Elev. 416.26
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/17, 1/17/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 35 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.54 ft.
Well Type monitoring
Well Construction:
Filter Pack 33 - 24 ft. Natural
Seal 24 - 22 ft.
Grout 22 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 394.98 Date 3-26-87
Static Water Elev. 396.57 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other pH = 69
Cond. = 3600 umhos Temp. = 56° F
Strong odor, cloudy, dark brown

WATER QUALITY

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ____
Recipient Geraghty & Miller for the Village of Sauget

Comments Subsurface soil samples from boring 20 - 30' analyzed for HSL compounds.

REMARKS

Site Dead Creek Site-O   Boring/Well No. O-2/Well #EE-22

Sample Depth	Blow Count	Description
		Well vegetated clay cap.
1 - 2.5	2-4-8	FILL consisting of brown silty CLAY. Trace of very fine grain sand.
3.5 - 5	3-5-6	Same as above.
6 - 7.5	2-2-2	Soft black silty CLAY. Black sponge-like substance @ 7.5' (.5')
		Fill discontinues @ approx. 8'.
8.5 - 10	3-5-7	Brown sandy SILT. Trace of fine grain sand. Dry.
11 - 12.5	3-5-7	Brown fine grain SAND. Dry.
13.5 - 15	1-1-1	Soft brown-gray silty CLAY. Trace of very fine grain sand. Moist.
16 - 17.5	3-6-6	Brown very fine grain SAND. Dry.
18.5 - 20	2-3-3	Brown-gray silty CLAY: mottled. Trace of very fine grain sand. Moist.
21 - 22.5	1-1-8	Gray fine grain SAND. Wet.
23.5 - 25	7-19-25	Same as above.
26 - 27.5	6-9-29	Same as above.
28.5 - 30	5-10-11	Same as above.
33.5 - 35	6-8-12	Same as above: oily sheen @ 34'
		E.O.B. @ 35'

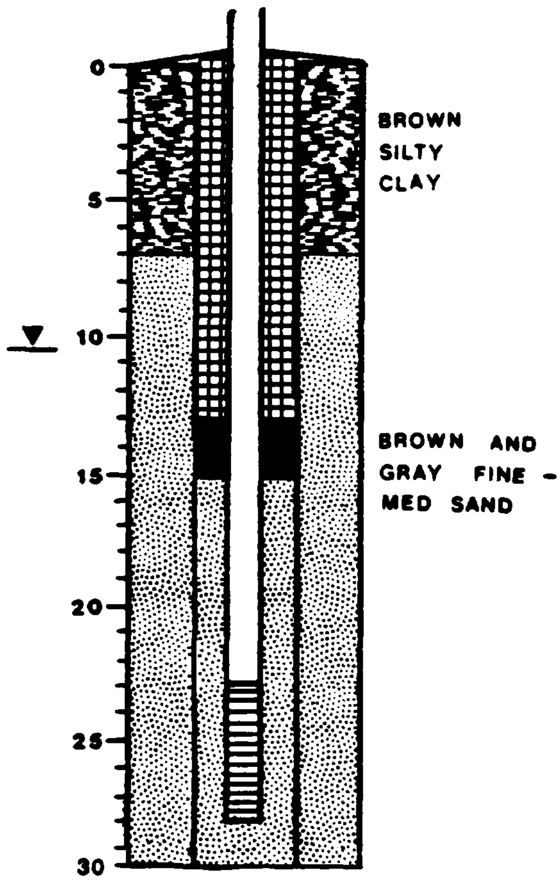
Site Dead Creek Site-O | Boring/Well No. O-1/Well #EE-21

Sample Depth	Blow Count	Description
		Grassy field on surface
1 - 2.5	4-5-4	Brown silty CLAY. Trace of very fine grain sand. Dry.
3.5 - 5	1-2-2	Same as above.
6 - 7.5	1-1-3	Same as above.
8.5 - 10	3-3-6	Brown fine grain SAND. Trace of silt. Dry.
11 - 12.5	5-5-6	Same as above. Trace of medium grain sand. Moist.
13.5 - 15	1-3-5	Brown medium grain SAND. Trace of coarse grain sand. Wet. Thin gray silty clay layer at 14' (2")
16 - 17.5	1-3-6	Gray fine grain SAND. Wet. Trace of thin gray silty clay layers at 16.5' (1")
18.5 - 20	1-5-5	Gray medium grain SAND. Trace of coarse grain sand and small to large gravel. Wet.
21 - 22.5	7-7-6	Same as above.
23.5 - 25	4-5-7	Same as above.
28.5 - 30	5-3-3	Same as above.
		E.O.B. @ 30'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-16-87
Prepared by Tim Maley

Depth (ft) Description

EE-21



Boring/Well No. O-1/EE-21
Location Site O
Owner IEPA
Top of Inner Casing Elev. 407.41
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/16, 2/16/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 30 ft.
Casing and Screen Diam. 2 in.
Screen Interval 23 - 28 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.13 ft.
Well Type monitoring
Well Construction:
Filter Pack 28 - 15 ft. Natural
Seal 15 - 13 ft.
Grout 13 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 395.77 Date 3-26-87
Static Water Elev. 397.56 Date 5-11-87
Slug Test Yes X No ____
Test Date 5-12-87
Hydraulic Conductivity 2.3×10^{-3} cm/sec
Other pH = 6.8
Cond. = 1800 umhos Temp. = 58° F
Cloudy, yellowish

WATER QUALITY

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ____
Recipient Geraghty & Miller for the Village of Sauget

Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.

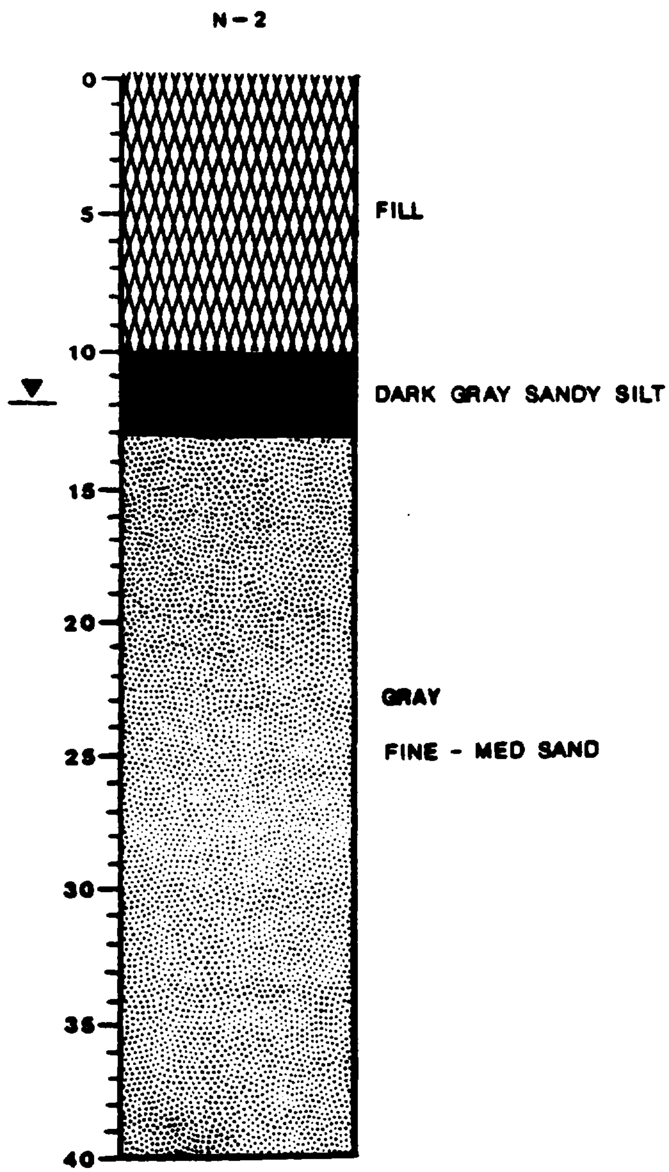
REMARKS

Site Dead Creek Site-M | Boring/Well No. M-2

Sample Depth	Blow Count	Description
		0-1 Crushed limestone fill
1 - 2.5	9-10-12	1-2 Crushed lime fill 2-2.5 FILL consisting of loose dark gray very sandy SILT. Some fine grain sand. Trace of organic material (wood & roots).
3.5 - 5	N	No recovery - possible rubber tire
6 - 7.5	N	No recovery - possible concrete
8.5 - 10	47-6-2	FILL consisting of dark gray silty clay with concrete material and gravel. Fill discontinues @ approx. 10'.
11 - 12.5	6-10-9	Firm dark gray very sandy SILT. Some very fine grain sand. Trace of organic material (wood and roots). Black streaks. Wet.
13.5 - 15	3-4-4	Firm gray fine to medium grain SAND. Trace of small to medium gravel. Wet. Sand is rounded to sub angular and fairly well to poorly sorted.
16 - 17.5	7-11-12	Gray fine to medium grain SAND. Trace of small gravel. Wet.
18.5 - 20	8-12-14	Dense brown fine to medium grain SAND. Well sorted. Wet.
21 - 22.5	9-13-15	Same as above.
23.5 - 25	9-11-15	Dense gray fine to medium SAND. Trace of coarse grain sand and small gravel. Wet.
26 - 27.5	8-12-13	Dense gray fine to coarse grain SAND. Trace of small gravel. Wet.
28.5 - 30	9-14-23	Same as above.
31 - 32.5	7-9-11	Dense gray very fine grain SAND. Wet.
33.5 - 35	6-8-10	Same as above. Darker gray.
36 - 37.5	12-17-23	Very dense. Gray fine to coarse grain SAND. Wet.
38.5 - 40	8-9-12	Same as above.
		E.O.B. @ 40'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-15-86
Prepared by Kevin Phillips

Depth (ft) Description



Boring/Well No. N-2
Location Site N
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/15,12/15/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers and rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 40.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. ______ Date ______
Static Water Elev. ______ Date ______
Slug Test Yes ______ No ______
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes ______ No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes ______ No X
Recipient

Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.

REMARKS

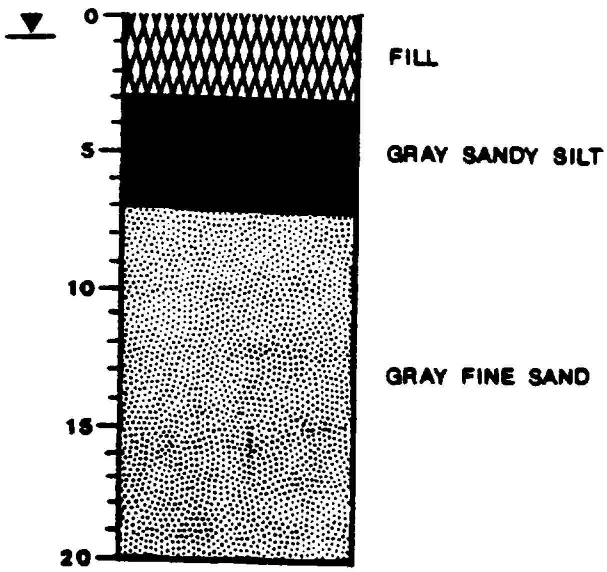
Site Dead Creek Site-M | Boring/Well No. M-1

Sample Depth	Blow Count	Description
1 - 2.5	4-6-10	0-2.5 FILL consisting of crushed limestone, gravel, and fine to coarse grain sand. Wet. Fill discontinues @ 3'.
3.5 - 5	3-9-9	3.5-4 Stiff gray very sandy SILT. Some fine grain sand. Wet. 4-5 Brown silty fine grain SAND. Wet.
6 - 7.5	2-4-3	6-7 Loose gray very sandy SILT. Some fine grain sand. Black and reddish staining throughout. Wet. 7-7.5 Loose brownish gray fine to medium grain SAND. Some reddish staining. Wet.
8.5 - 10	2-4-7	Loose gray sandy SILT. Some fine grain sand. Trace of organic material (wood, etc.). Stained black. Wet.
11 - 12.5	1-2-5	Loose brown very silty fine grain SAND. Some silt. Black stained layer at 12' (-1")
13.5 - 15	1-3-3	Same as above.
16 - 17.5	2-5-7	Firm gray silty fine grain SAND. Trace of small to medium gravel. Wet.
18.5 - 20	2-3-7	Firm gray fine grain SAND. Wet. E.O.B. @ 20'

Project Name: Dead Creek
Project No.: IL 3140
Date Prepared: 12-15-86
Prepared by: Kevin Phillips

Depth (ft) | Description

N - 1



Boring/Well No.: N-1
Location: Site N
Owner: IEPA
Top of Inner Casing Elev.: NA
Drilling Firm: Fox drilling
Driller: Jerry Hammon
Start & Completion Dates: 12/15,12/15/86
Type of Rig: Mobile B-61

Method of Drilling: 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam.: 8 in.
Boring Depth: 20.0 ft.
Casing and Screen Diam.:
Screen Interval:
Screen Type:
Stickup:
Well Type:
Well Construction:
- Filter Pack:
- Seal:
- Grout:
- Lock No.:

TEST DATA

Static Water Elev.: ______ Date: ______
Static Water Elev.: ______ Date: ______
Slug Test: Yes ____ No ____
Test Date:
Hydraulic Conductivity:
Other:

WATER QUALITY

Samples Taken: Yes ____ No X
No. of Samples:
Types of Samples:

Date Sampled:
Samplers:
Samples Analyzed for:

Split Samples: Yes ____ No X
Recipient:

Comments: Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.

REMARKS

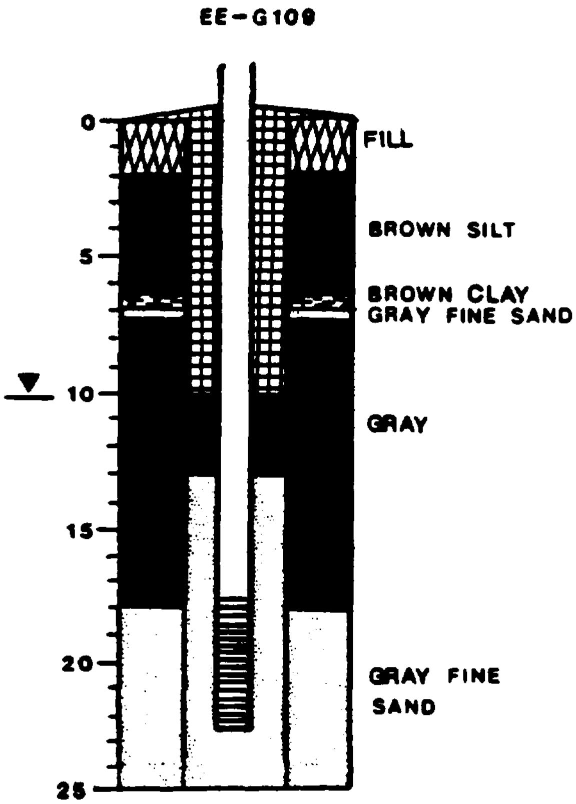
Site Dead Creek Site-L

Boring/Well No. L-4/Well # EE-G109
(IEPA Replacement Well)

Sample Depth	Blow Count	Description
		0-2' FILL consisting of black asphalt and clay.
1 - 2.5	5-6-7	from 2' Brown sandy SILT. Moist.
3.5 - 5	3-3-4	Brown sandy SILT. Trace of medium grain sand.
6 - 7.5	3-4-4	6.5-7 Brown silty CLAY. Trace of fine grain sand. 7-7.5 Gray fine grain SAND. Trace of silt and clay.
8.5 - 10	3-4-6	Brown-gray (mottled) clayey SILT. Trace of fine grain sand. Moist.
11 - 12.5	4-7-8	Gray sandy SILT. Wet.
13.5 - 15	6-11-13	Same as above. Trace of fine grain sand.
16 - 17.5	8-14-34	Stiff gray sandy SILT. Thin laminated black-gray layering.
18.5 - 20	8-13-15	Gray fine grain SAND. Wet.
21 - 22.5	9-12-17	Same as above.
23.5 - 25	7-14-18	Dark gray fine to coarse grain SAND. Some black staining. Wet.
		E.O.B. @ 25'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-16-86
Prepared by Tim Maley

Depth (ft) Description



(IEPA well replaced)
Boring/Well No. L-4/EE-G109
Location Site L
Owner IEPA
Top of Inner Casing Elev. 409.71
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/16,12/16/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 25.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 17.5 - 22.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.94 ft.
Well Type monitoring
Well Construction:
Filter Pack 25 - 13 ft.
Seal 13 - 10 ft.
Grout 10 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 397.42 Date 3-26-87
Static Water Elev. 398.45 Date 5-11-87
Slug Test Yes____ No X
Test Date
Hydraulic Conductivity
Other pH = 5.0
Cond. = 4500 umhos Temp. = 58° F
Cloudy, dark, strong odor

WATER QUALITY

Samples Taken Yes X No____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds, volatile organics

Split Samples Yes____ No X
Recipient

Comments Subsurface soil samples from boring 10' - 20' analyzed for HSL compounds.

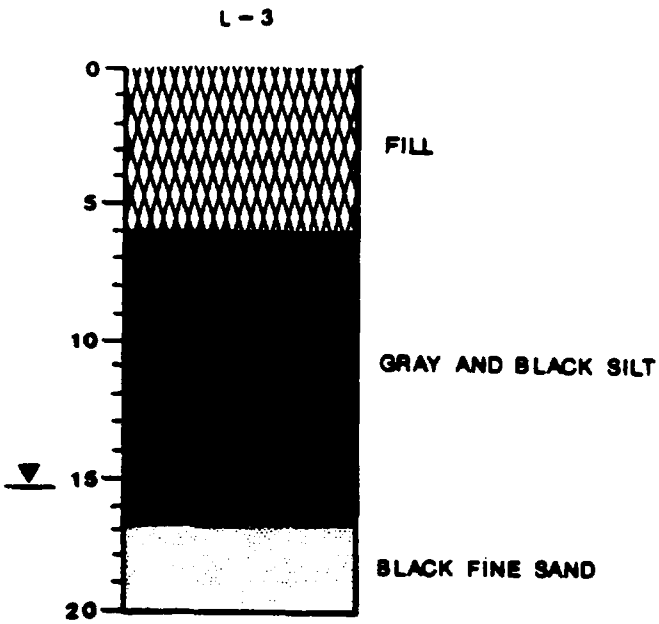
REMARKS

Site Dead Creek Site-L   Boring/Well No. L-3

Sample Depth	Blow Count	Description
		0-1 Black cinders FILL
1 - 2.5	6-7-9	FILL consisting of stiff brown-gray silty CLAY. Trace of fine grain sand, small gravel, and brick fragments. Moist.
3.5 - 5	5-5-6	FILL consisting of stiff gray silty CLAY. Little small gravel; trace of fine grain sand, large gravel, brick fragments, and wood chips. Moist.
		Fill apparently discontinues @ approx. 6'.
6 - 7.5	2-2-3	6-6.5 Loose dark gray SILT. Stained black. 6.5-7.5 Loose brownish gray very sandy SILT. Some fine grain sand. Moist.
8.5 - 10	3-4-6	Firm, gray clayey SILT. Some brownish staining. Trace of fine grain sand. Moist. Mottled.
11 - 12.5	3-3-5	Firm black clayey SILT. Some clay. Little fine grain sand. Very moist.
13.5 - 15	3-3-5	Firm black-gray sandy SILT. Some fine grain sand. Little clay. Moist.
16 - 17.5	2-5-10	16-17 Same as above. Wet. 17-17.5 Black silty SAND. Wet.
18.5 - 20	1-2-4	Firm black fine grain SAND. Well sorted. Wet.
		E.O.B. @ 20'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-12-86
Prepared by Kevin Phillips

Depth (ft) Description



Boring/Well No. L-3
Location Site L
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/12,12/12/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analysed for

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 0 - 20' analysed for HSL compounds.

REMARKS

Strong organic odor

Ground elev. 407.90

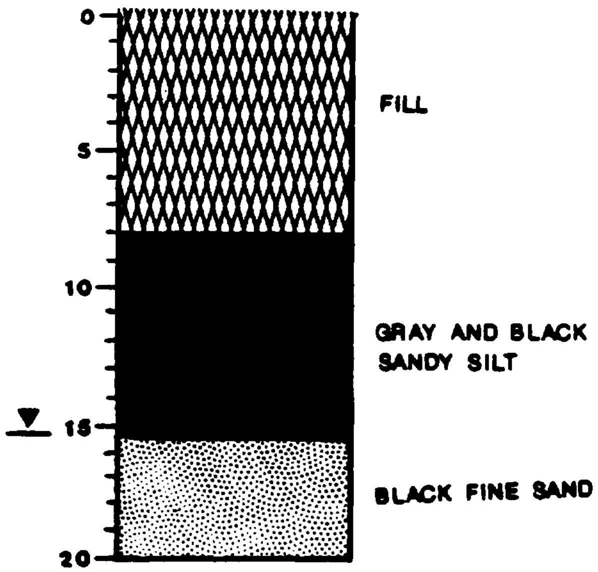
Site Dead Creek Site-L Boring/Well No. L-2

Sample Depth	Blow Count	Description
		0-1 Fill on surface - black cinders.
1 - 2.5	4-12-60	FILL consisting of black silty CLAY. Trace of small gravel and concrete fragments. Moist.
3.5 - 5	8-5-7	FILL consisting of hard dark gray silty CLAY. Trace of small gravel, brick fragments, and wood chips.
6 - 7.5	2-4-8	FILL consisting of black-gray silty CLAY. Trace of small gravel and wood chips. Very moist. Stained black.
		Fill discontinues @ 8'.
8.5 - 10	2-2-3	Soft gray very sandy SILT. Some fine grain sand. Very moist. Black staining throughout.
11 - 12.5	6-7-14	Same as above.
13.5 - 15	4-8-9	Loose black sandy SILT. Some fine grain sand. Very moist.
16 - 17.5	2-2-3	Loose black fine grain SAND. Wet.
18.5 - 20	2-3-6	Same as above. Trace of silt. Wet.
		E.O.B. @ 20'.

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-12-86
Prepared by Kevin Phillips

Depth (ft) Description

L - 2



Boring/Well No. L-2
Location Site L
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/12,12/12/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.

REMARKS

Strong organic odor

Ground elev. 407.32

Site Dead Creek Site-L | Boring/Well No. L-1

Sample Depth	Blow Count	Description
1 - 2.5	4-6-7	0-2 FILL consisting of black sandy clay with asphalt, cinders, and gravel. Fill discontinues @ approx. 2'. 2-2.5 Brown silty CLAY. Some small gravel. Moist.
3.5 - 5	4-4-3	Brown clayey SILT. Little fine grain sand. Moist.
6 - 7.5	3-3-6	Same as above.
8.5 - 10	2-2-2	Same as above. Very moist.
11 - 12.5	2-1-1	Soft gray clayey SILT. Little fine grain sand. Wet.
13.5 - 15	1-1-1	Soft brownish-gray very silty CLAY. Trace of fine grain sand. Occasional thin seams of gray clayey silt. Moist.
16 - 17.5	WOR	Loose gray fine grain SAND. Wet.
18.5 - 20	5-5-7	Same as above. Wet.
		E.O.B. @ 20'

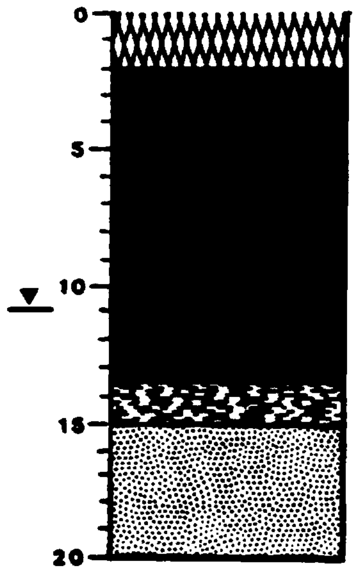
Project Name: Dead Creek
Project No.: IL 3140
Date Prepared: 12-11-86
Prepared by: Kevin Phillips

Boring/Well No.: L-1
Location: Site L
Owner: IEPA
Top of Inner Casing Elev.: NA
Drilling Firm: Fox drilling
Driller: Jerry Hammon
Start & Completion Dates: 12/11, 12/11/86
Type of Rig: Mobile B-61

Method of Drilling: 3 3/4" I.D. hollow stem augers

Depth (ft) | Description

L-1



WELL DATA

Hole Diam.: 8 in.
Boring Depth: 20.0 ft.
Casing and Screen Diam.:
Screen Interval:
Screen Type:
Stickup:
Well Type:
Well Construction:
- Filter Pack:
- Seal:
- Grout:
- Lock No.:

TEST DATA

Static Water Elev. ______ Date ______
Static Water Elev. ______ Date ______
Slug Test Yes ____ No ____
Test Date:
Hydraulic Conductivity:
Other:

WATER QUALITY

Samples Taken Yes ____ No X
No. of Samples:
Types of Samples:

Date Sampled:
Samplers:
Samples Analysed for:

Split Samples Yes ____ No X
Recipient:

Comments: Subsurface soil samples from boring 5 - 10' analysed for HSL compounds.

REMARKS

Ground elev. 408.31

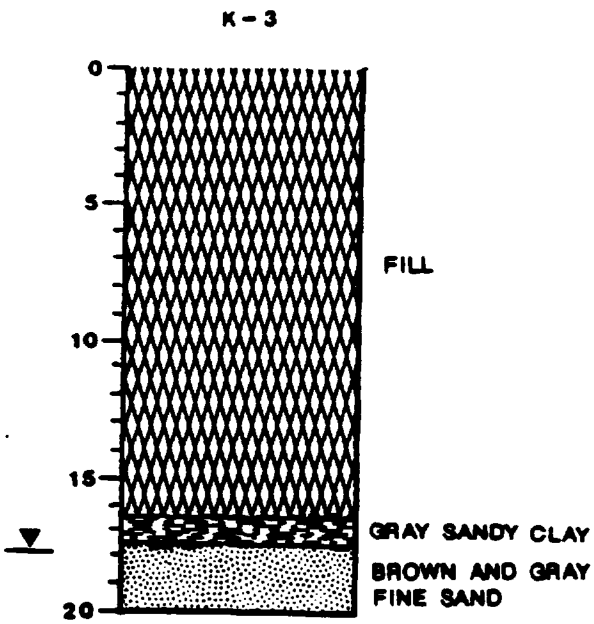
Site Dead Creek Site-K

Boring/Well No. K-3

Sample Depth	Blow Count	Description
1 - 2.5	6-7-12	FILL consisting of brown-black silty CLAY. Some small gravel and crushed limestone fragments.
3.5 - 5	6-7-9	FILL consisting of black sandy CLAY with small gravel, slag material, asphalt, and cinders.
6 - 7.5	1-1-1	FILL consisting of black clayey SAND. Trace of small gravel. Wet.
8.5 - 10	1-2-1	Same as above.
11 - 12.5	1-2-2	No recovery.
13.5 - 15	4-10-5	FILL consisting of soft black silty CLAY. Trace of fine to medium grain sand, small gravel, and limestone fragments. Wet.
		Fill discontinues @ approx. 16.5'.
16 - 17.5	2-3-6	Gray sandy CLAY. Very moist.
18.5 - 20	1-3-4	Brown-gray fine grain SAND. Wet.
		E.O.B. @ 20'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-22-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. K-3
Location Site K
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/22, 1/22/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
- Filter Pack
- Seal
- Grout
- Lock No.

TEST DATA

Static Water Elev. ______ Date ______
Static Water Elev. ______ Date ______
Slug Test Yes ____ No ____
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes ____ No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes ____ No X
Recipient

Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.

REMARKS

Ground elev. 405.26

Site Dead Creek Site-K

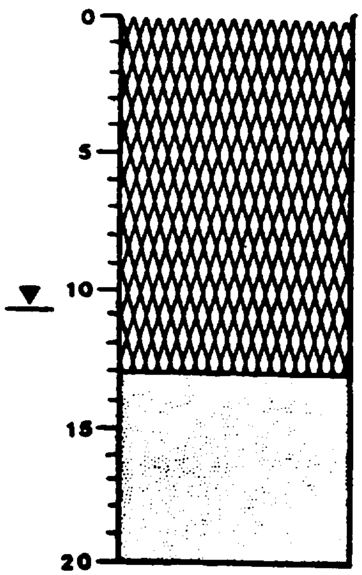
Boring/Well No. K-2

Sample Depth	Blow Count	Description
1 - 2.5	10-11-25	FILL consisting of brown-gray-black sandy CLAY with crushed limestone, gravel, and brick fragments. Moist.
3.5 - 5	3-4-5	Same as above.
6 - 7.5	1-2-2	Same as above. Silty and soft.
8.5 - 10	2-2-1	Same as above. Trace of medium grain sand and small gravel. Very moist.
11 - 12.5	3-3-4	Same as above. Trace of wood chips. Wet. Fill discontinues @ approx. 13'.
13.5 - 15	1-6-8	Firm dark gray-gray very fine grain SAND. Well rounded and well sorted. Black streaking @ 13 3/4' (~2"). Wet.
16 - 17.5	2-4-4	Same as above. Natural black staining.
18.5 - 20	10-11-14	Same as above. Cleaner. Wet.
		E.O.B. @ 20'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1/12/87
Prepared by Kevin Phillips

Depth (ft) Description

K – 2



Boring/Well No. K-2
Location Site K
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/12, 1/12/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.

REMARKS

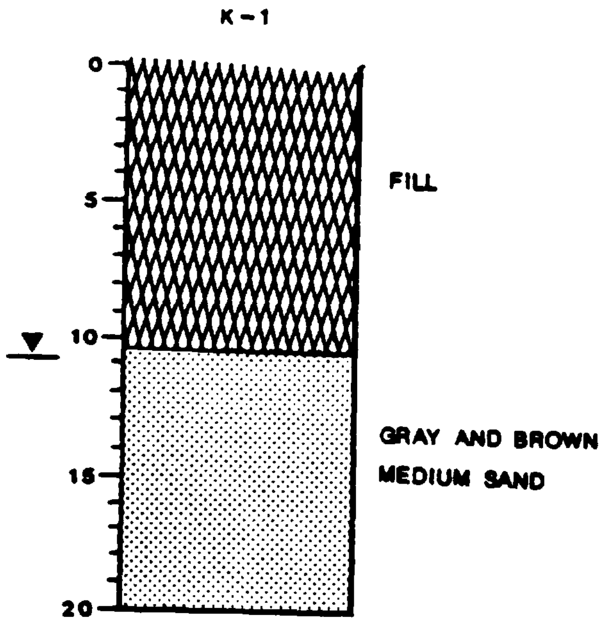
Ground elev. 405.45

Site Dead Creek Site-K Boring/Well No. K-1

Sample Depth	Blow Count	Description
1 - 2.5	14-11-11	FILL consisting of dark brown silty CLAY. With crushed limestone and brick fragments. Trace of medium grain sand and small gravel.
3.5 - 5	2-2-1	Same as above. Moist.
6 - 7.5	1-2-1	Same as above.
8.5 - 10	2-3-6	Same as above. Slightly stained. FILL discontinues @ approx. 10.5'.
11 - 12.5	3-6-9	Gray-brown medium grain SAND. Wet. Some black staining @ 11'. Thin clay layer at 12' (-3.5").
13.5 - 15	3-5-7	Gray-brown medium grain SAND. Wet.
16 - 17.5	3-3-4	Gray-brown medium to coarse grain SAND. Trace of small gravel. Wet.
18.5 - 20	2-3-4	Same as above.
		E.O.B. @ 20'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-16-86
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. K-1
Location Site K
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/16,12/16/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.

REMARKS

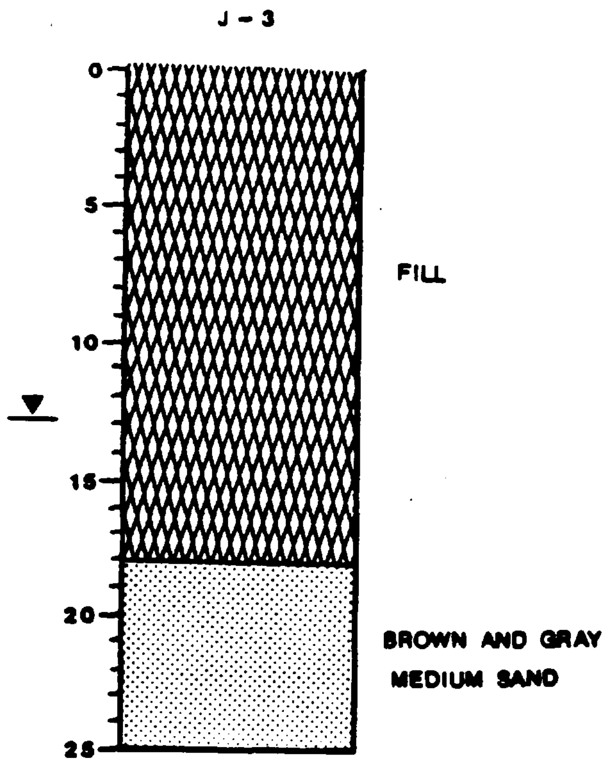
Ground elev. 405.86

Site Dead Creek Site-J Boring/Well No. J-3

Sample Depth	Blow Count	Description
		Foundry sand on surface.
1 - 2.5	4-5-8	FILL consisting of black-dark brown sandy CLAY. Trace of medium grain sand (foundry) and brick fragments.
3.5 - 5	6-9-14	Same as above. Auger refusal at 5'. Large obstruction encountered. Moved boring 6' north. Continue sampling.
6 - 7.5	2-2-3	FILL consisting of black-dark brown sandy CLAY. Trace of medium grain foundry sand and slag material. Loose and dry @ 10'.
8.5 - 10	3-3-3	Same as above.
11 - 12.5	2-2-1	Same as above. Moist.
13.5 - 15	1-2-3	Same as above. Wet.
16 - 17.5	1-2-8	Same as above. Fill discontinues @ approx. 18'.
18.5 - 20	2-5-7	Brown-gray medium grain SAND. Wet.
23.5 - 25	4-7-10	Same as above. Increased coarse grain sand.
		E.O.B. @ 25'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-17-86
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. J-3
Location Site J
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/17,12/17/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 25.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples(soil) Yes X No
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil sampled from boring 0 - 10' analyzed for HSL compounds.

REMARKS

Ground elev. 412.89

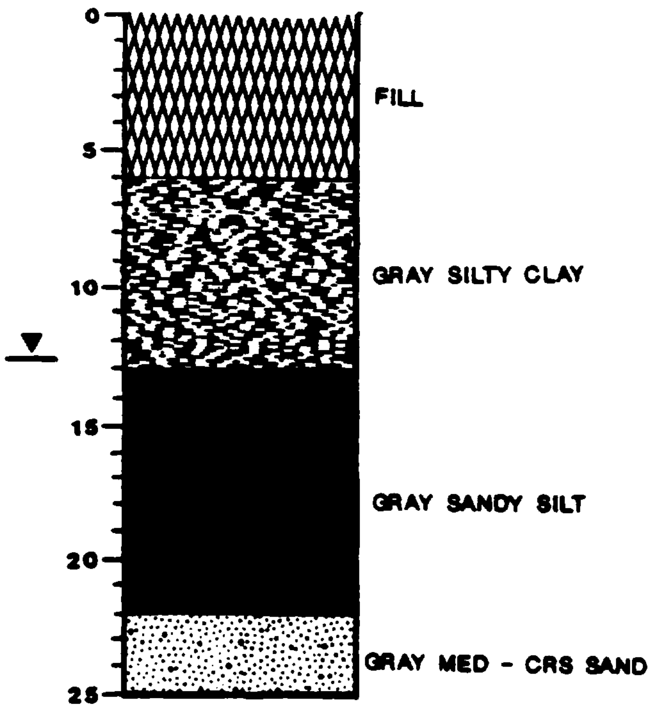
Site Dead Creek Site-J　　　Boring/Well No. J-2

Sample Depth	Blow Count	Description
		Black foundry sand on surface.
1 - 2.5	5-5-27	FILL consisting of black-dark gray sandy CLAY. Some foundry sand and crushed limestone fragments.
3.5 - 5	5-6-7	Same as above. Fill discontinues @ approx. 6'.
6 - 7.5	2-2-3	Gray silty CLAY. Slightly mottled. Trace of fine grain sand.
8.5 - 10	2-3-4	Same as above. Siltier and trace of small gravel @ 10'.
11 - 12.5	2-3-3	Gray fine grain sandy SILT. Wet @ 13'.
13.5 - 15	3-4-4	Same as above. Wet.
16 - 17.5	2-2-2	Same as above.
18.5 - 20	1-1-2	Same as above. Varved @ 19'.
21 - 22.5	1-1-9	Gray medium to coarse grain SAND. Trace of small gravel. Wet. Gasoline odor.
23.5 - 25	4-9-14	Same as above. Wet.
		E.O.B. @ 25'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-17-86
Prepared by Tim Maley

Depth (ft) Description

J - 2



Boring/Well No. J-2
Location Site J
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/17,12/17/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 25.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analysed for

Split Samples(soil) Yes X No
Recipient Sterling steel

Comments Subsurface soil samples from boring 15 - 25' analyzed for HSL compounds.

REMARKS

Gasoline odor

Ground elev. 413.10

Site Dead Creek Site-J

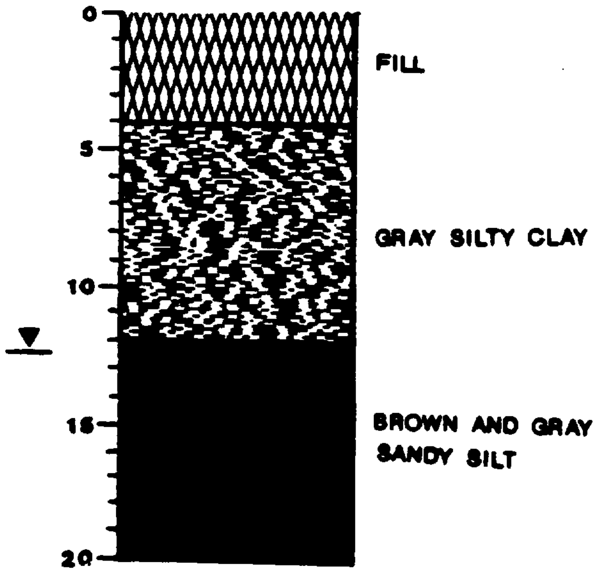
Boring/Well No. J-1

Sample Depth	Blow Count	Description
		Black foundry SAND on surface.
1 - 2.5	4-4-8	FILL consisting of black-dark brown-rust colored medium grain SAND. Trace of crushed limestone and brick fragments.
3.5 - 5	2-5-6	Foundry sand FILL to 4'. Then: Gray silty CLAY. Slightly mottled. Trace of fine grain sand.
6 - 7.5	2-2-4	Same as above.
8.5 - 10	3-3-4	Same as above. Siltier @ 10'.
11 - 12.5	3-4-6	Light brown silty SAND. Becomes sandy SILT at 12'.
13.5 - 15	2-4-5	Brown sandy SILT. Wet.
16 - 17.5	3-5-6	Same as above.
18.5 - 20	2-2-3	Dark gray sandy SILT. Some fine grain sand. Wet.
		E.O.B. @ 20'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-17-86
Prepared by Tim Maley

Depth (ft) Description

J-1



Boring/Well No. J-1
Location Site J
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/17,12/17/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples(soil) Yes X No
Recipient Sterling steel

Comments Subsurface soil sample from boring 10 - 20' analyzed for HSL compounds.

REMARKS

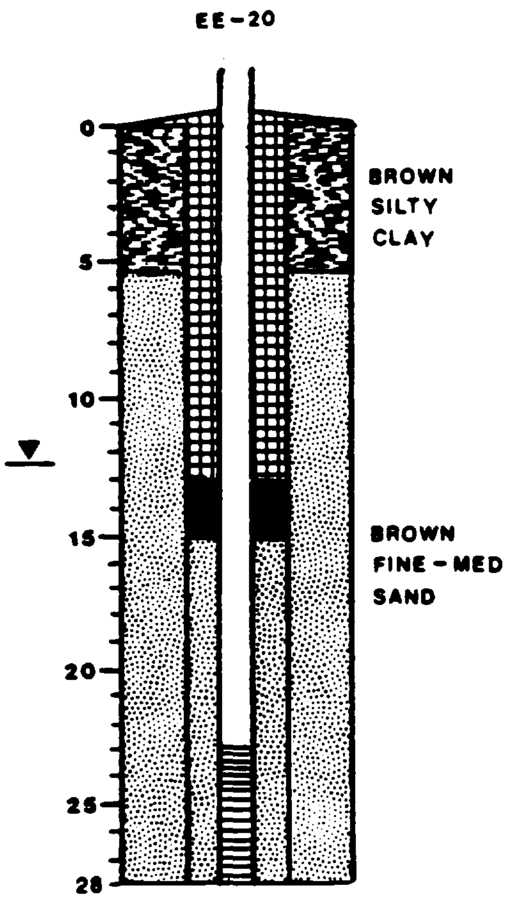
Ground elev. 411.76

Site Dead Creek Site-I Boring/Well No. I-12/Well #EE-20

Sample Depth	Blow Count	Description
		Dark brown sandy clay topsoil on surface.
1 - 2.5	2-3-2	Brown silty CLAY. Dry.
3.5 - 5	3-3-2	Same as above.
6 - 7.5	3-3-5	Brown fine to medium grain SAND. Dry.
8.5 - 10	3-5-8	Same as above.
11 - 12.5	3-5-8	Same as above. Moist @ 12.5'.
13.5 - 15	4-8-13	Same as above. Wet.
16 - 17.5	1-2-4	Same as above.
18.5 - 20	2-5-9	Same as above.
21 - 22.5	3-5-11	Same as above.
23.5 - 25	4-7-11	Brown medium grain SAND. Wet. Trace of coarse grain sand @ 24-25'.
26 - 27.5	7-11-20	Same as above. Trace of small gravel. Wet.
		E.O.B. @ 28'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-13-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. I-12/EE-20
Location Site I
Owner IEPA
Top of Inner Casing Elev. 411.41
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/13, 2/13/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 28 ft.
Casing and Screen Diam. 2 in.
Screen Interval 23 - 28 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.41 ft.
Well Type monitoring
Well Construction:
Filter Pack 28 - 15 ft. Natural
Seal 15 - 13 ft.
Grout 13 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 397.49 Date 3-26-87
Static Water Elev. 398.91 Date 5-11-87
Slug Test Yes ___ No X
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-23-87
Samplers E & E
Samples Analyzed for HSL compounds, volatile organics

Split Samples Yes X No ___
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 3.5 - 12.5 feet analyzed for HSL compounds.

REMARKS

Background location

Site Dead Creek Site-I

Boring/Well No. I-11 (cont.)

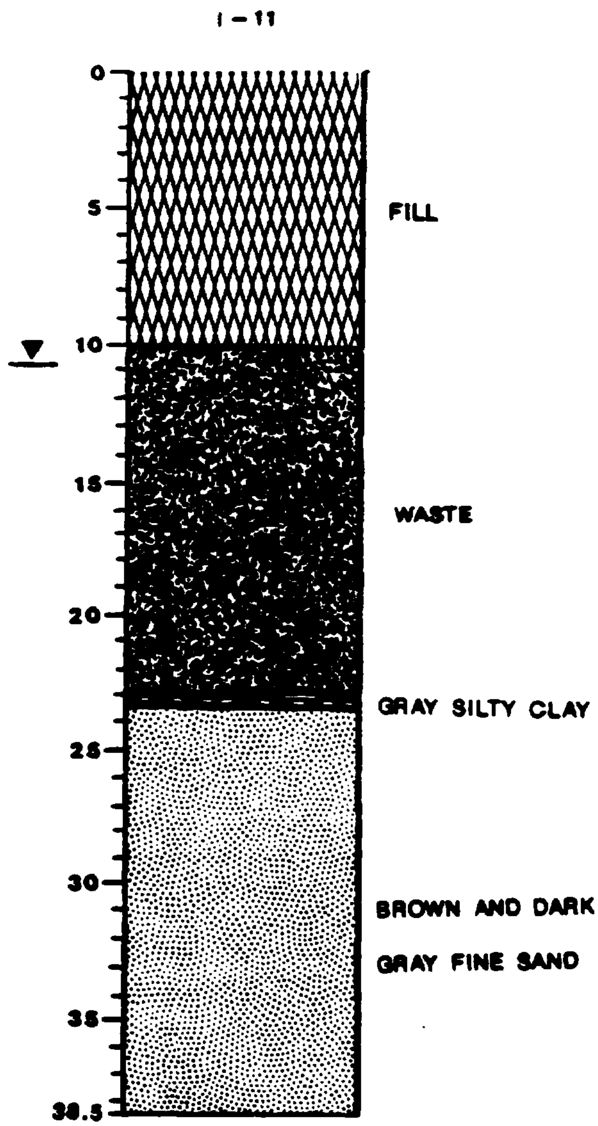
Sample Depth	Blow Count	Description
33.5 - 35	4-7-13	Same as above.
37 - 38.5	8-17-16	Same as above.
		E.O.B. @ 38.5'

Site Dead Creek Site-I Boring/Well No. I-11

Sample Depth	Blow Count	Description
		Crushed limestone parking lot surface.
1 - 2.5	11-7-13	FILL consisting of black-dark brown sandy CLAY with brick fragments, crushed limestone, small gravel, and slag material.
3.5 - 5	5-6-7	Same as above.
6 - 7.5	4-4-3	FILL consisting of gray-black silty CLAY. Trace of medium grain sand and gravel. Moist.
8.5 - 10	1-5-2	FILL consisting of soft black-gray silty CLAY. Slightly mottled. Moist.
11 - 12.5	3-2-2	WASTE consisting of black soft sandy clay (sludge) with some debris including a hard rubber material and coarse grain sand. Wet with an oily sheen.
13.5 - 15	4-5-4	WASTE - same as above. More hard rubber material and black stained debris.
16 - 17.5	7-11-9	WASTE - same as above. Trace of paper products, clay, and small gravel. Wet with black oily sheen.
18.5 - 20	7-22-9	WASTE - same as above.
		* Very difficult drilling @ 21'. Possible large metalic object encountered. Destroyed fish-tail bit on end of plug. Re-locate boring ~20' east. Continue logging @ 21-22.5'.
21 - 22.5	2-2-4	Poor recovery - WASTE consisting of black oily material with a hard rubber like debris. Wet.
		WASTE discontinues @ approx. 23'.
23.5 - 25	2-10-14	23.5-23 3/4 Thin soft gray silty clay layer. (~1" to 2" thick) Then brown fine grain SAND. Some black staining. Wet.
26 - 27.5	1-2-5	Dark gray fine grain SAND. Trace of medium to coarse grain sand. Wet with some black staining.
28.5 - 30	5-8-14	Same as above. Trace of small to medium gravel @ 29-30'.
31 - 32.5	9-13-20	Same as above.

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-5-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. I-11
Location Site I
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/5 & 2/5/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 38.5 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples(soil) Yes X No
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 6 - 20' & 26 - 38.5' analyzed for HSL compounds.

REMARKS

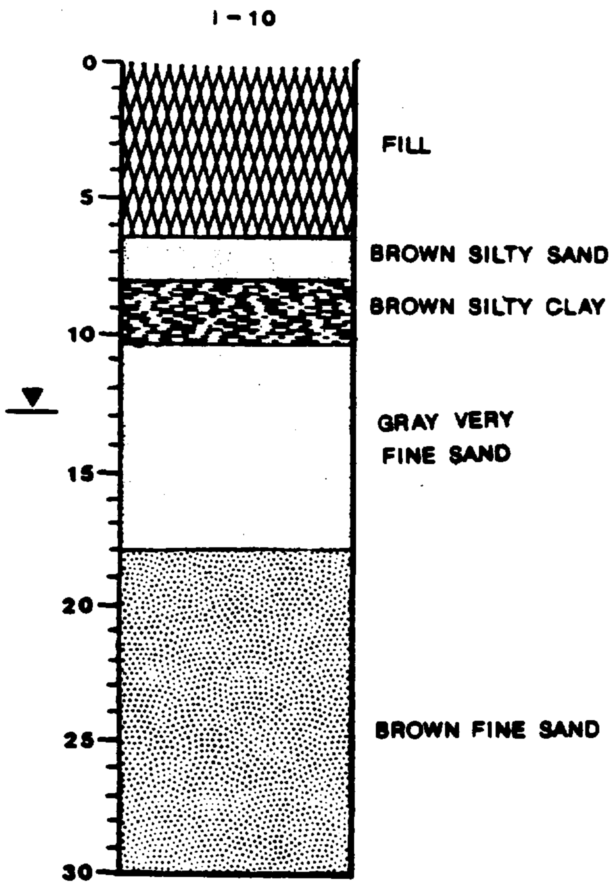
Ground elev. 405.88

Site Dead Creek Site-I Boring/Well No. I-10

Sample Depth	Blow Count	Description
		FILL material on surface.
1 - 2.5	12-15-12	FILL consisting of black-brown sandy CLAY including a mixture of wood, slag gravel, crushed limestone, a yellow powdery substance, and brick fragments. Dry.
3.5 - 5	6-3-3	FILL - same as above.
		Fill discontinues @ approx. 6.5'.
6 - 7.5	2-2-2	From 6.5' - brown very fine silty SAND. Dry. Trace of clay @ 7.5'.
8.5 - 10	4-3-3	Brown silty CLAY. Trace of fine grain sand. Slightly mottled with gray stringers. Dry.
11 - 12.5	6-6-8	Gray very fine silty SAND. Moist.
13.5 - 15	3-3-6	Same as above. Wet.
16 - 17.5	3-7-9	Same as above. Less silty, wet.
18.5 - 20	2-5-7	Brown fine grain SAND. Black staining @ 19-19.5'. Wet.
21 - 22.5	6-9-5	Same as above. Becomes gray fine grain SAND.
23.5 - 25	6-9-13	Same as above. Black staining @ 24.5-25'.
26 - 27.5	7-11-12	Same as above. Black staining.
28.5 - 30	11-12-14	Same as above.
		E.O.B. @ 30'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-4-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. I-10
Location Site I
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/4 & 2/4/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 30.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples(soil)Yes X No
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 15 - 30' analyzed for HSL compounds.

REMARKS

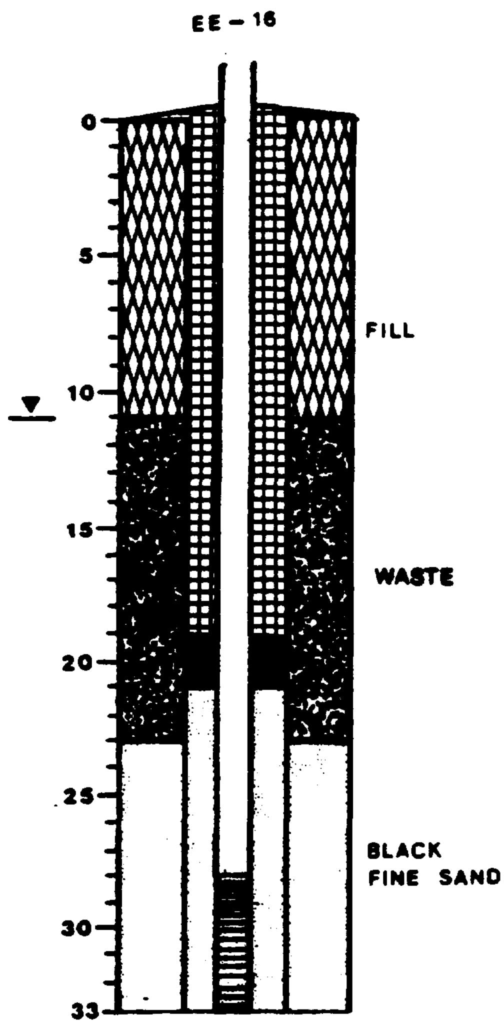
Ground elev. 408.68

Site Dead Creek Site-I Boring/Well No. I-9/Well #EE-16

Sample Depth	Blow Count	Description
		Fill materials on surface.
1 - 2.5	5-8-10	FILL consisting of black clayey SAND and slag gravel. Dry.
3.5 - 5	4-5-5	FILL - same as above.
6 - 7.5	2-6-6	FILL consisting of black-brown sandy CLAY including a mixture of slag gravel, crushed limestone, and cinders. Dry.
8.5 - 10	4-12-4	FILL - same as above; mostly slag gravel and cinders.
11 - 12.5	2-3-2	WASTE consisting of black sandy oily stained sludge including a mixture of wood, cardboard, slag, and small spherical beads. Wet.
13.5 - 15	4-10-19	WASTE - same as above. Wet.
16 - 17.5	100/6	WASTE - no recovery; very difficult drilling due to large obstruction.
18.5 - 20	6-12-9	WASTE - cuttings from large obstruction showed a hard rubber or graphite material.
21 - 22.5	72-100/6	WASTE - no recovery; probably same fill materials. Fill appeared to discontinue @ 23'.
23.5 - 25	4-4-5	Black (stained) fine grain SAND. Wet (with oily sheen).
26 - 27.5	5-6-12	Same as above, heavy oily staining.
28.5 - 30	7-12-9	Same as above; with a trace of medium to coarse grain SAND.
		E.O.B. - drill to 33'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-4-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. I-9/EE-16
Location Site I
Owner IEPA
Top of Inner Casing Elev. 408.65
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/4/87,2/4/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 33 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.74 ft.
Well Type monitoring
Well Construction:
Filter Pack 33 - 21 ft. Natural
Seal 21 - 19 ft.
Grout 19 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 397.27 Date 3-26-87
Static Water Elev. 398.56 Date 5-11-87
Slug Test Yes ___ No X
Test Date
Hydraulic Conductivity
Other pH = 7.2
Cond. = 3000 umhos Temp. = 58° F
Dark, cloudy, strong odor

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-23-86
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ___
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 6.5 - 22.5 feet and 23.5 - 30' feet analyzed for HSL compounds.

REMARKS

Site Dead Creek Site-I

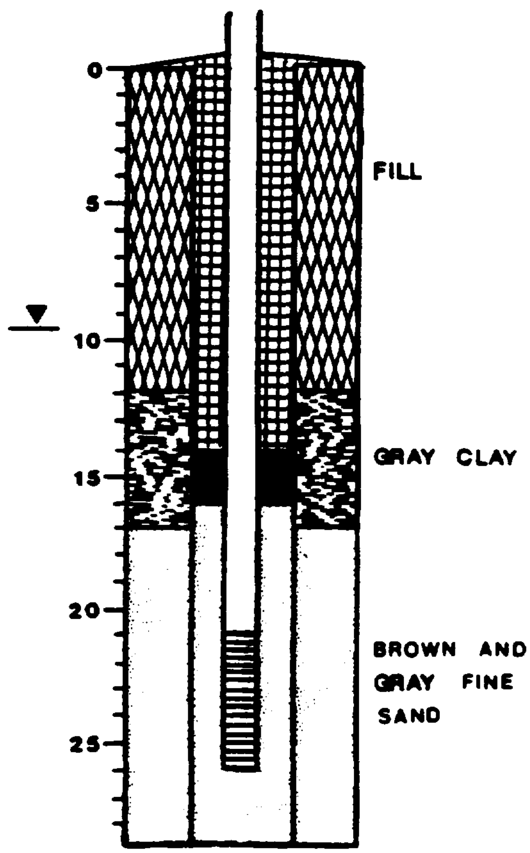
Boring/Well No. I-8/Well #EE-G112
IEPA replacement well

Sample Depth	Blow Count	Description
		Straight drill to 17.5'.
		Stratigraphic sequence based on auger cuttings.
		0'to 5' FILL consisting of brown fine to medium grain SAND including crushed limestone, gravel, and brick fragments.
		5'to 12' FILL consisting of black asphaltic sand and gravel including oily cinders and soft clay.
		Fill discontinues @ approx. 13'.
		12' to 17' Gray silty clay.
		17'to 23' Brown to gray fine grain SAND. Some silt. Wet.
		23 to 27.5' Brown to gray medium grain SAND. Trace of small gravel. Wet.
		27.5' to 27 3/4' Gray silty clay. Moist.
		27 3/4' to 29' Gray fine grain SAND.
Three samples taken for screen placement.		
17.5 - 19	2-3-4	Brown fine grain SAND. Wet.
22.5 - 24	4-5-7	Gray fine to medium grain SAND. Trace of coarse grain sand and small gravel. Wet.
27.5 - 29	6-7-9	4" gray silty clay layer on top of gray fine grain SAND. Wet.
		E.O.B. @ 29'

Project Name: Dead Creek
Project No.: IL 3140
Date Prepared: 2-3-87
Prepared by: Tim Maley

Depth (ft) Description

EE-G112



(IEPA well replaced)
Boring/Well No.: I-8/EE-G112
Location: Site I
Owner: IEPA
Top of Inner Casing Elev.: 407.87
Drilling Firm: Fox drilling
Driller: Jerry Hammon
Start & Completion Dates: 2/3/87,2/3/87
Type of Rig: Mobile B-61

Method of Drilling: 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam.: 8 in.
Boring Depth: 29.0 ft.
Casing and Screen Diam.: 2 in.
Screen Interval: 21 - 26 ft.
Screen Type: stainless steel 0.01" slot
Stickup: 1.19 ft.
Well Type: monitoring
Well Construction:
- Filter Pack: 26 - 16 ft. Natural
- Seal: 16 - 14 ft.
- Grout: 14 ft. to surface
- Lock No.: 2834

TEST DATA

Static Water Elev.: 397.00 Date: 3-26-87
Static Water Elev.: 398.39 Date: 5-11-87
Slug Test: Yes X No ___
Test Date: 5-12-87
Hydraulic Conductivity: 3.4 x 10 cm/sec
Other: ph = 7.6
Cond. = 1600 umhos Temp. = 58° F
Yellowish, slight odor

WATER QUALITY

Samples Taken: Yes X No ___
No. of Samples: 1 round
Types of Samples: groundwater

Date Sampled: 3-23-87
Samplers: E & E
Samples Analyzed for: HSL compounds

Split Samples: Yes ___ No X
Recipient: ___

Comments: ___

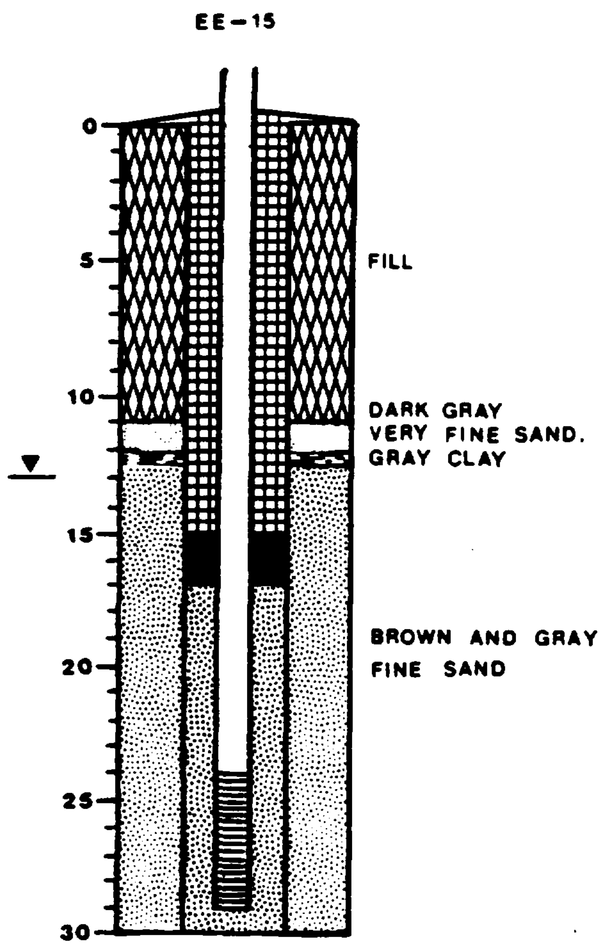
REMARKS

Site Dead Creek Site-I Boring/Well No. I-7/Well #EE-15

Sample Depth	Blow Count	Description
		0-1 Black clayey topsoil
1 - 2.5	3-3-4	FILL consisting of brown-gray silty CLAY. Dry.
3.5 - 5	4-8-4	FILL consisting of brown-gray silty CLAY. Trace of fine grain sand and crushed limestone. Dry.
6 - 7.5	1-1-1	FILL - same as above. Moist.
8.5 - 10	3-4-8	FILL consisting of brown-gray-black silty CLAY. Some fine to medium grain sand and crushed limestone. Dry.
		Fill apparently discontinues @ approx. 11'.
11 - 12.5	1-3-4	11-12' Dark gray very fine grain SAND. Moist. 12-12.5 Soft gray silty CLAY. Moist. Water @ 13'.
13.5 - 15	1-3-	Brown fine grain SAND. Wet.
16 - 17.5	1-3-5	Same as above.
18.5 - 20	2-6-8	Same as above; slightly siltier.
21 - 22.5	12-15-15	Same as above; less silt.
23.5 - 25	5-8-12	Gray very fine grain SAND. Wet.
26 - 27.5	12-10-10	Same as above.
28.5 - 30	6-8-10	Same as above.
		E.O.B. @ 30'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-3-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. I-7/EE-15
Location Site I
Owner IEPA
Top of Inner Casing Elev. 406.41
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/3/87,2/3/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 30 ft.
Casing and Screen Diam. 2 in.
Screen Interval 24 - 29 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.33 ft.
Well Type monitoring
Well Construction:
Filter Pack 29 - 17 ft. Natural
Seal 17 - 15 ft.
Grout 15 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 397.63 Date 3-26-87
Static Water Elev. 398.93 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity 0.47 x10 cm/sec
Other pH = 7.2
Cond. = 1800 umhos Temp. = 56° F
Yellowish

WATER QUALITY

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-23-87
Samplers E & E
Samples Analysed for HSL compounds

Split Samples Yes X No
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 3.5 - 12.5 feet and 13.5 - 22.5 feet analyzed for HSL compounds.

REMARKS

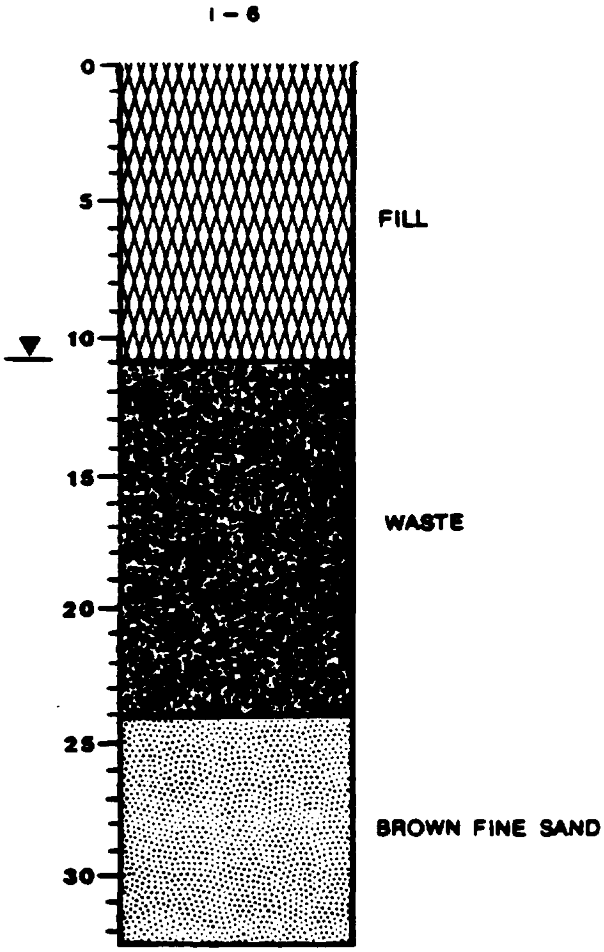
Slight odor

Site Dead Creek Site-I Boring/Well No. I-6

Sample Depth	Blow Count	Description
		Fill on surface.
1 - 2.5	24-12-14	FILL consisting of brown silty CLAY including a mixture of fine to coarse grain sand, gravel, and crushed limestone.
3.5 - 5	3-60/3	FILL - same as above. High blow count caused by brick obstruction.
6 - 7.5	3-10-10	FILL - same as above; with additional debris such as cardboard, cinders, and slag.
8.5 - 10	3-2-2	FILL - same as above; with increased amount of sand. Moist.
11 - 12.5	3-2-1	WASTE consisting of gray silty CLAY including black oily sludge, fine to coarse grain sand, gravel, brick fragments, and slag. Wet (with oily film).
13.5 - 15	1-1-2	WASTE consisting of black (heavily stained) sandy CLAY. Including black oily sludge, medium to coarse grain sand. Wood chips, cinders, and gravel. Wet.
16 - 17.5	2-3-4	WASTE - same as above.
18.5 - 20	2-7-8	WASTE - same as above, some black sludge or tar-like substance mixed with wood and cardboard.
21 - 22.5	11-11-10	WASTE consisted of various debris including black oily stained layered cardboard, paint pigments, burlap cloth, and a yellow sludge-like substance. Wet.
		WASTE discontinues @ approx. 24'.
23.5 - 25	10-11-12	From 24', brown (some black staining) fine grain SAND. Some silt. Wet.
26 - 27.5	4-4-5	Same as above. A 1/4" gray silty clay layer @ 26.5'.
28.5 - 30	0-1-1	Brown fine grain SAND. Some black staining. Wet.
31 - 32.5	10-13-18	Same as above.
		E.O.B. @ 32.5'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-2-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. I-6
Location Site I
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/2 & 2/2/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 32.5 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analysed for

Split Samples(soil) Yes X No
Recipient Sverdrup, Inc. for Cerro Copper
Comments Subsurface soil sample from boring 10 - 25' analysed for HSL compounds.

REMARKS

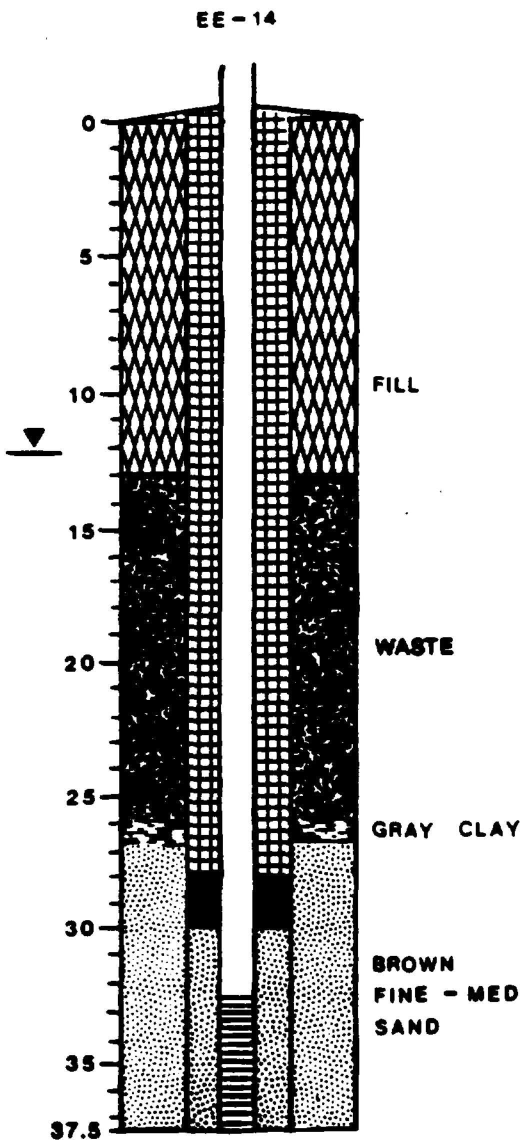
Ground elev. 408.30

Site Dead Creek Site-I | Boring/Well No. I-5/Well #EE-14

Sample Depth	Blow Count	Description
		Crushed limestone parking lot surface.
1 - 2.5	24-00	FILL consisting of dark brown-black sandy CLAY including a mixture of fine to coarse grain sand, limestone fragments, clay, and concrete (large obstruction caused spoon refusal).
3.5 - 5	4-6-8	FILL consisting of black-gray silty CLAY.
6 - 7.5	11-14-8	FILL consisting of light gray-black sandy CLAY including crushed limestone, small to large gravel, fine to coarse grain sand, and wood chips. Dry.
8.5 - 10	4-17-4	FILL - same as above; with some brick fragments.
11 - 12.5	2-2-1	FILL consisting of gray silty CLAY. Some black staining, trace of fill debris including cloth products and cinders.
13.5 - 15	2-2-3	WASTE consisting of black sandy CLAY including a mixture of cinders, slag, small to large gravel, and fine to coarse grain sand. (Moist)
16 - 17.5	4-2-5	No recovery - probably same fill material. Water @ 17.5'.
18.5 - 20	3-5-3	WASTE consisting of black sandy CLAY including some gravel and slag. Wet (with oily sheen).
21 - 22.5	4-1-5	No recovery - probably same fill material.
23.5 - 25	5-9-5	WASTE - same as above. Fill apparently discontinues @ approx. 26'.
26 - 27.5	4-2-3	26-26 3/4' Black-gray-brown silty CLAY then black very fine grain SAND Some silt and black staining. Wet.
28.5 - 30	3-4-3	Black very fine grain SAND. Stained. Wet. From 29-29 1/4' is a gray silty CLAY layer. Then brown fine grain SAND. Slightly stained. Wet. Trace of medium grain sand.
31 - 32.5	2-4-2	Brown fine to medium grain SAND. Wet.
36 - 37.5	8-16-24	Brown medium to coarse grain SAND. Trace of small gravel. Wet. Tip of spoon (37.5') showed dark gray very fine grain SAND. Trace of small gravel.
		E.O.B. @ 37.5'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-30-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. I-5/EE-14
Location Site I
Owner IEPA
Top of Inner Casing Elev. 410.95
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/30, 1/30/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

WELL DATA

Hole Diam. 8 in.
Boring Depth 37.5 ft.
Casing and Screen Diam. 2 in.
Screen Interval 32.5 - 37.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.56 ft.
Well Type monitoring
Well Construction:
Filter Pack 37.5 - 30 ft. Natural
Seal 30 - 28 ft.
Grout 28 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 397.23 Date 3-26-87
Static Water Elev. 398.55 Date 5-11-87
Slug Test Yes ___ No X
Test Date
Hydraulic Conductivity
Other pH = 7.4
Cond. = 3400 umhos Temp. = 56° F
Cloudy, yellowish

WATER QUALITY

Samples Taken Yes X No ___
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-23-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ___
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 5' - 27.5 feet and 28.5 - 37.5 feet analyzed for HSL compounds.

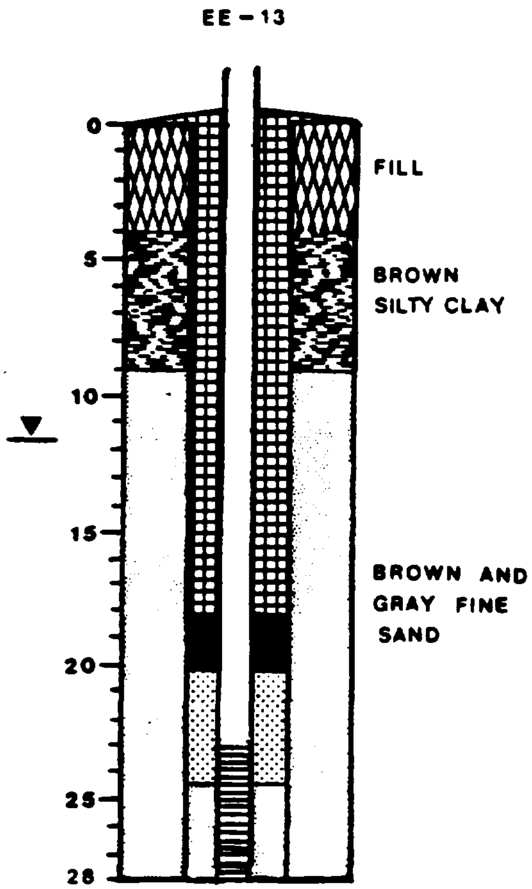
REMARKS

Site Dead Creek Site-I   Boring/Well No. I-4/Well # EE-13

Sample Depth	Blow Count	Description
		Fill on surface.
1 - 2.5	8-7-50	FILL consisting of brown and black sandy CLAY, including a mixture of crushed limestone, small to medium gravel, and concrete fragments.
		Fill discontinues @ approx. 4'.
3.5 - 5	3-4-4	From 4', brown very silty CLAY. Dry.
6 - 7.5	3-4-5	Brown silty CLAY; to 9'.
8.5 - 10	2-3-2	From 9', brown very fine grain SAND. Some silt. Thinly bedded. Water @ 9.5'.
11 - 12.5	1-3-2	Same as above.
13.5 - 15	1-1-1	Same as above; some interbedding of siltier material. Wet.
16 - 17.5	1-2-3	Same as above; to 19'.
18.5 - 20	1-2-3	From 19', brown (turning gray) SILT. Wet.
21 - 22.5	1-2-2	Gray fine grain SAND. Wet.
23.5 - 25	0-1-0	Same as above.
26 - 27.5	0-1-2	Same as above.
		E.O.B. @ 28'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-29-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. I-4/EE-13
Location Site I
Owner IEPA
Top of Inner Casing Elev. 409.16
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/29,1/29/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 28.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 23 - 28 ft.
Screen Type stainless steel 0.01" slot
Stickup 0.52 ft.
Well Type monitoring
Well Construction:
Filter Pack 28 - 20 ft.
Seal 20 - 18 ft.
Grout 18 ft. to surface
Lock No. 2834

TEST DATA

Static Water Elev. 397.47 Date 3-26-87
Static Water Elev. 398.75 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity 1.3 x 10⁻⁴cm/sec
Other pH = 7.2
Cond. = 1800 umhos Temp. = 56° F
Clear to yellowish

WATER QUALITY

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-23-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No
Recipient Sverdrup, Inc. for Cerro Copper

Comments

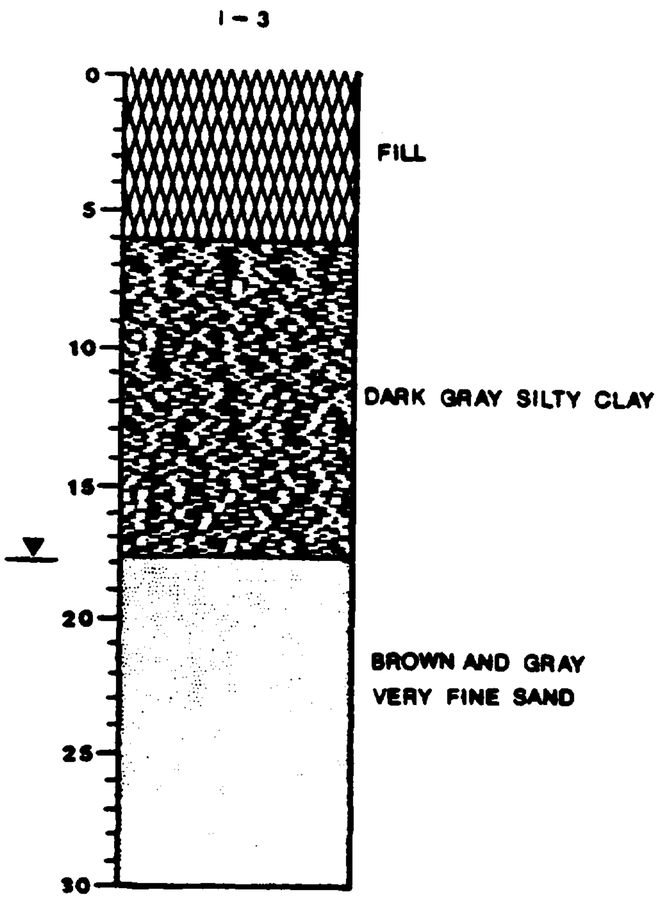
REMARKS

Site Dead Creek Site-I　　　　Boring/Well No. I-3

Sample Depth	Blow Count	Description
		Crushed limestone parking lot surface.
1 - 2.5	56-21-19	FILL consisting of brown and black sandy CLAY including crushed lime stone, small to medium gravel and slag material. Dry.
3.5 - 5	5-11-5	FILL - same as above; with some wood chips.
		Fill discontinues @ approx. 6'.
6 - 7.5	2-3-4	Dark gray silty CLAY. Trace of fine grain sand.
8.5 - 10	1-2-3	Same as above; some rust color staining.
11 - 12.5	1-2-2	Same as above; mottled brown & gray.
13.5 - 15	2-3-2	Same as above.
16 - 17.5	1-2-3	Same as above.
		Water @ 18'.
18.5 - 20	1-1-3	Brown very fine grain SAND. Some silt, thinnly bedded. Wet.
21 - 22.5	2-3-3	Gray very fine grain SAND. Wet.
23.5 - 25	1-2-2	Same as above.
26 - 27.5	1-2-3	Same as above.
28.5 - 30	0-1-3	Same as above.
		E.O.B. @ 30'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-29-87
Prepared by Tim Maley

Depth (ft) Description



Boring/Well No. I-3
Location Site I
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/29, 1/29/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

WELL DATA

Hole Diam. 8 in.
Boring Depth 30.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

TEST DATA

Static Water Elev. ______ Date ______
Static Water Elev. ______ Date ______
Slug Test Yes ____ No ____
Test Date
Hydraulic Conductivity
Other

WATER QUALITY

Samples Taken Yes ____ No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples(soil) Yes X No ____
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.

REMARKS

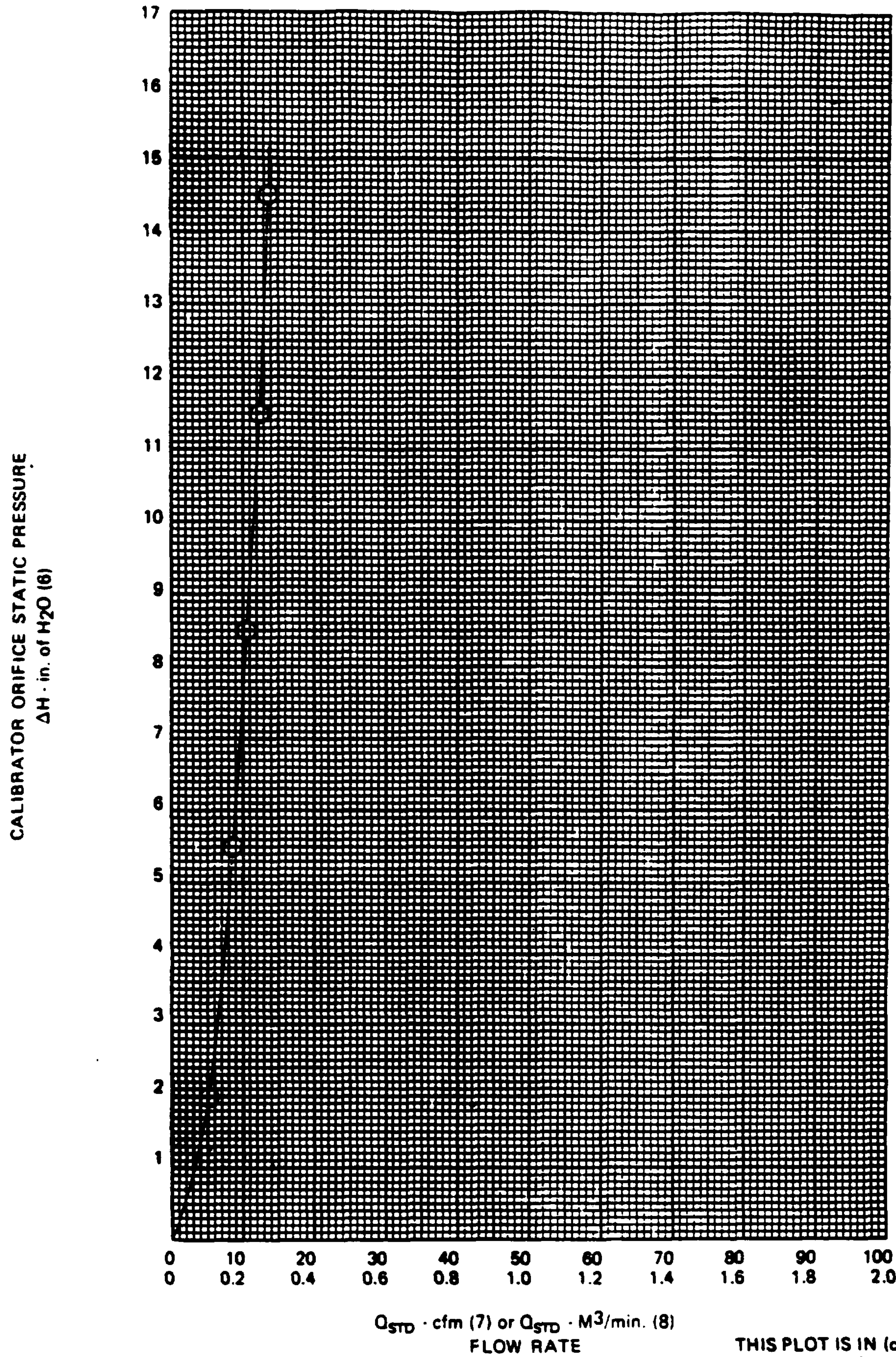
Site Dead Creek Site-I

Boring/Well No. I-2 (cont.)

Sample Depth	Blow Count	Description
36 - 37.5	18-18-22	Same as above.
38.5 - 40	11-24-37	Same as above.
		E.O.B @ 40'

Site Dead Creek Site-I | Boring/Well No. I-2

Sample Depth	Blow Count	Description
		Crushed limestone parking lot surface.
1 - 2.5	3-6-9	FILL consisting of black sandy CLAY including a mixture of fine-medium grain sand, asphalt, cinders, gravel, and slag. Dry.
3.5 - 5	1-1-2	FILL - same as above.
6 - 7.5	3-6-4	FILL consisting of black-brown silty CLAY. Trace of fine grain sand (in seams) @ 7'. Including some slag and wood particles. Dry.
8.5 - 10	3-2-2	WASTE consisting of light brown silty CLAY (to 9') including very loose black cinder material and medium grain sand. Dry.
11 - 12.5	51-11/1	WASTE - spoon refusal - probably a large obstruction in fill material. Wet.
13.5 - 15	2-2-2	WASTE consisting of black oily stained sludge-like material. Including fine to coarse grain sand, cinders, clay, and stained wood. Wet (with oily sheen).
16 - 17.5	16-7-6	WASTE. Same as above; with more wood particles.
18.5 - 20	0-1-2	WASTE - poor recovery - probably same material.
21 - 22.5	7-8-10	WASTE - same as above.
		Fill discontinues @ approx. 23.5'.
23.5 - 25	4-6-8	Black (stained) and gray SILT. Some very fine grain sand. Wet (with oily sheen).
26 - 27.5	2-3-2	Gray fine grain SAND. Some black staining. Wet.
28.5 - 30	9-7-3	Same as above.
31 - 32.5	11-11-11	Gray fine grain SAND. Interbedding of finer silty sand and coarser sand with small gravel; (approx. 4 inch layers). Wet.
33.5 - 35	5-10-12	Same as above.

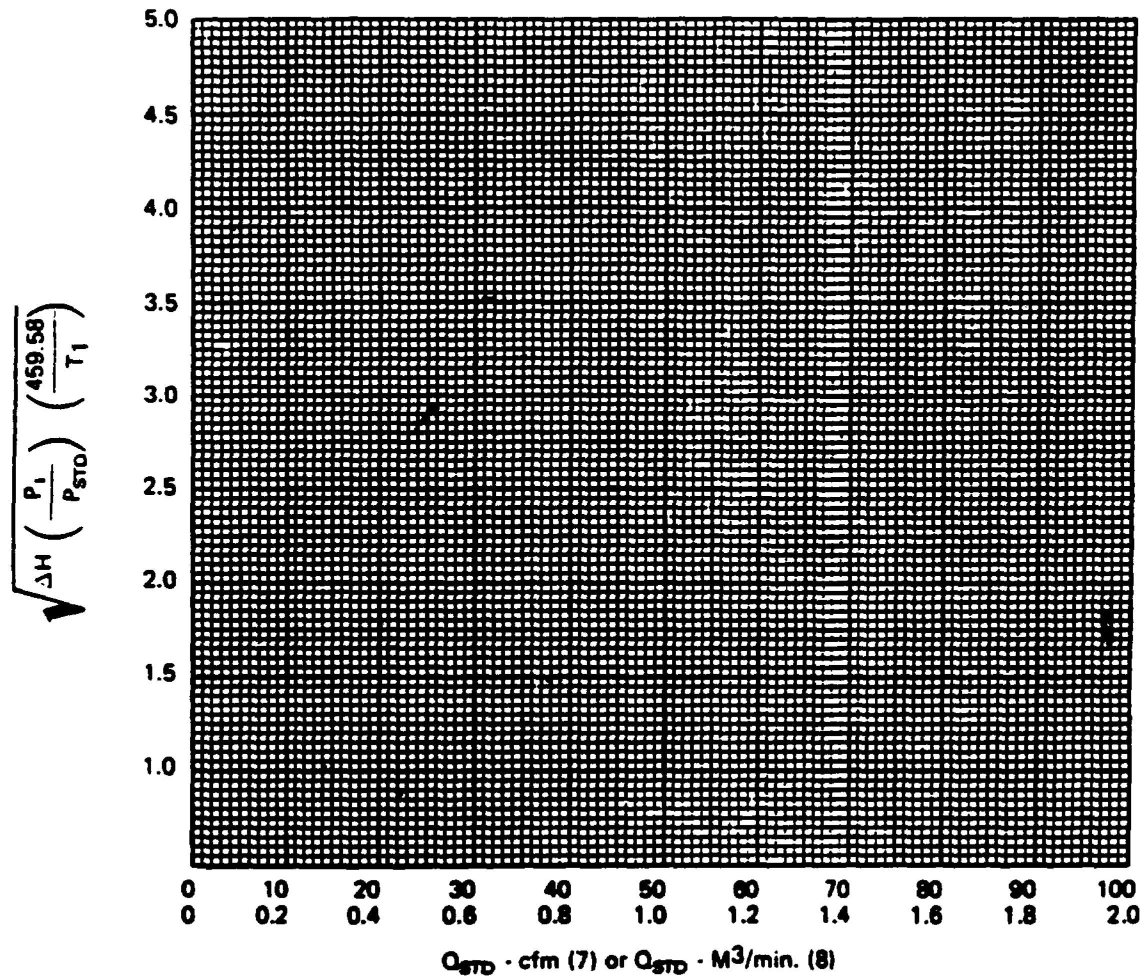


THIS PLOT IS IN (check one)

cfm ✓

M^3/min. ____

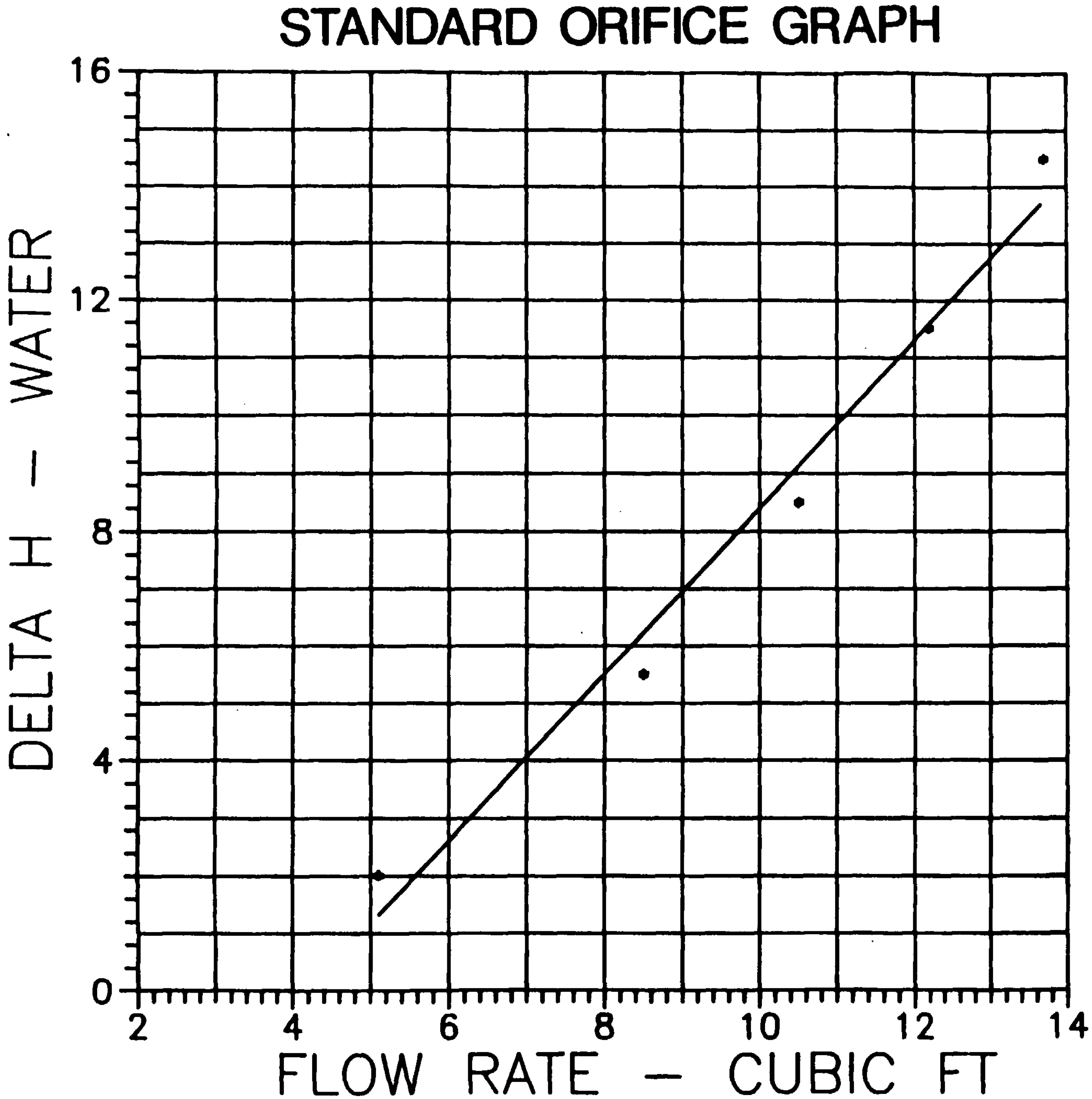
They are NOT EQUIVALENT

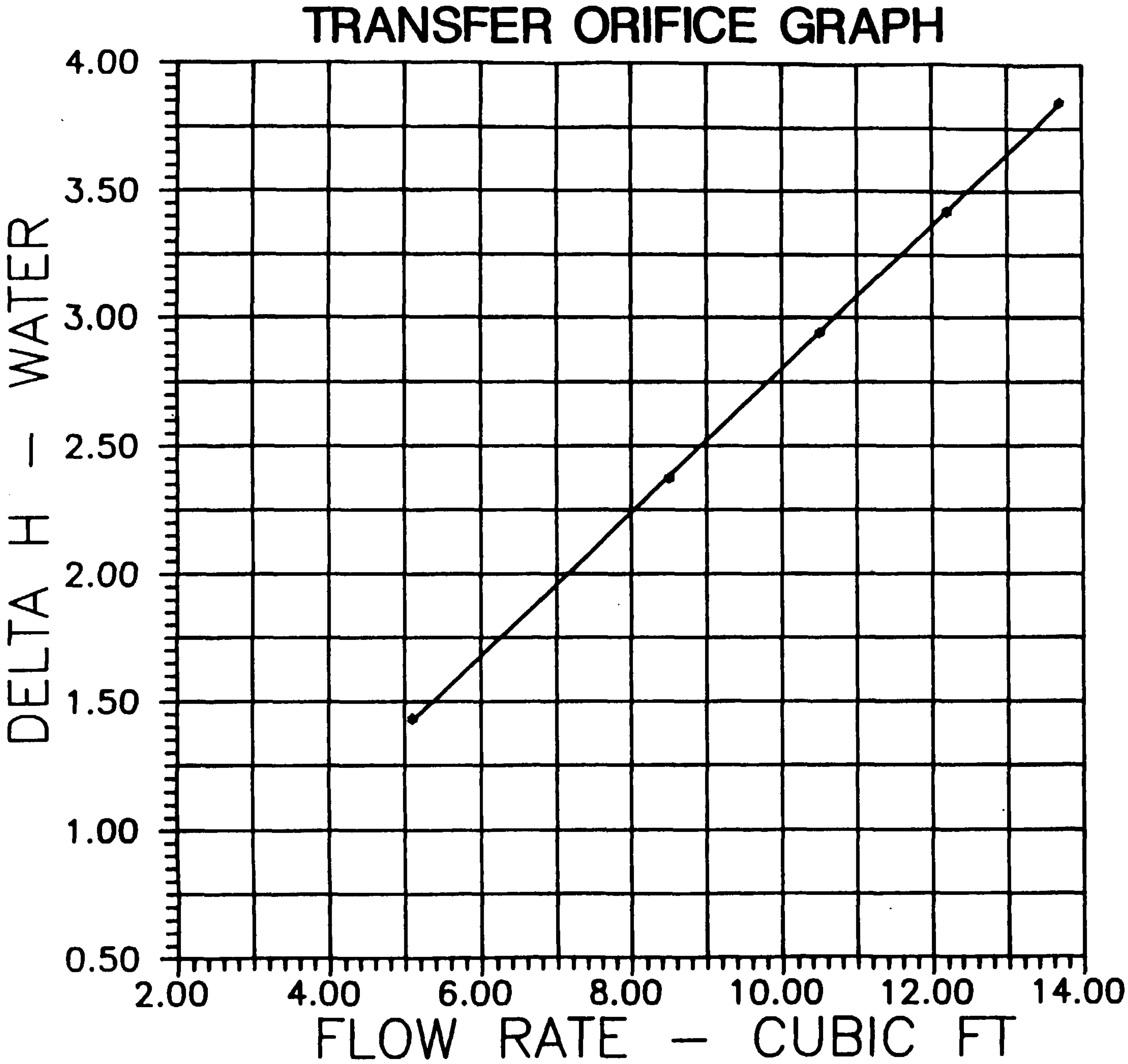


FLOW RATE

THIS PLOT IS IN (check one)
cfm ________
M^3/min. ________
They are NOT EQUIVALENT

For application see ref. 1


STANDARD ORIFICE GRAPH
DELTA H - WATER
FLOW RATE - CUBIC FT
0
4
8
12
16
2
4
6
8
10
12
14


TRANSFER ORIFICE GRAPH
DELTA H - WATER
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
2.00
4.00
6.00
8.00
10.00
12.00
14.00
FLOW RATE - CUBIC FT

GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/15/87

Site Address: NEAR CREEK · SITE G

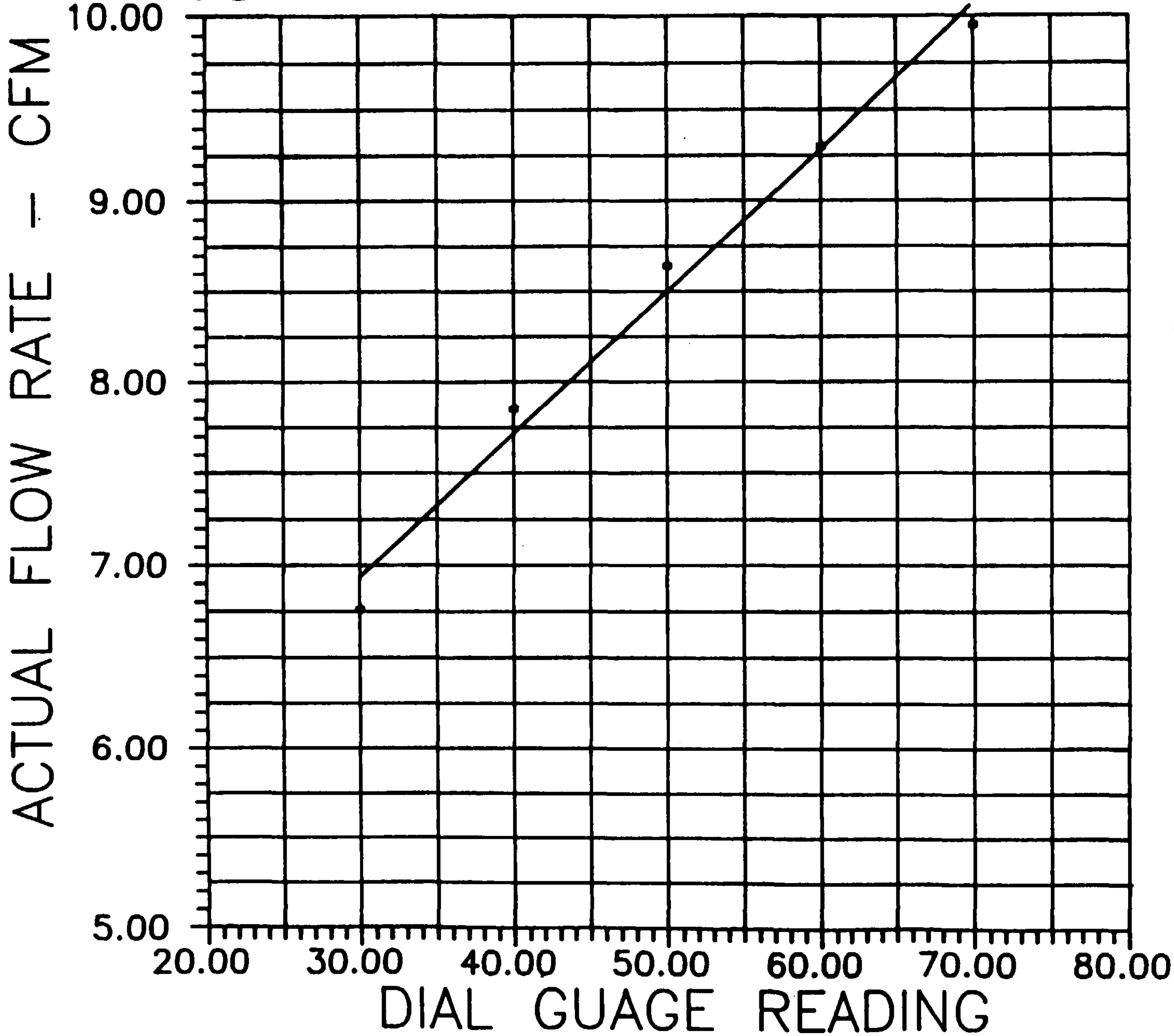
PS-1 Shelter No.: SE · 3 Station Pressure: 30.02

GMW Model 40' OCU No.: 45-C

Magnehelic Gauge Reading	Manometer Reading (in. H_2O)	OCU Flow-Rate (tcfm)	Temp. (^{o}C)
70	3.8/3.7		64 °F
60	3.4/3.2		"
50	2.9/2.8		"
40	2.4/2.3		"
30	1.8/1.7		"

Comments: WIND SPEED 8 MPH
DIRECTION 220° (SW)

PUF AIR SAMPLER CALIBRATION - EE3



GMW MODEL PS-1 CALIBRATION FORM

Name: A. Sewall **Date:** 7/15/87

Site Address: Bear Creek - 3/TAG

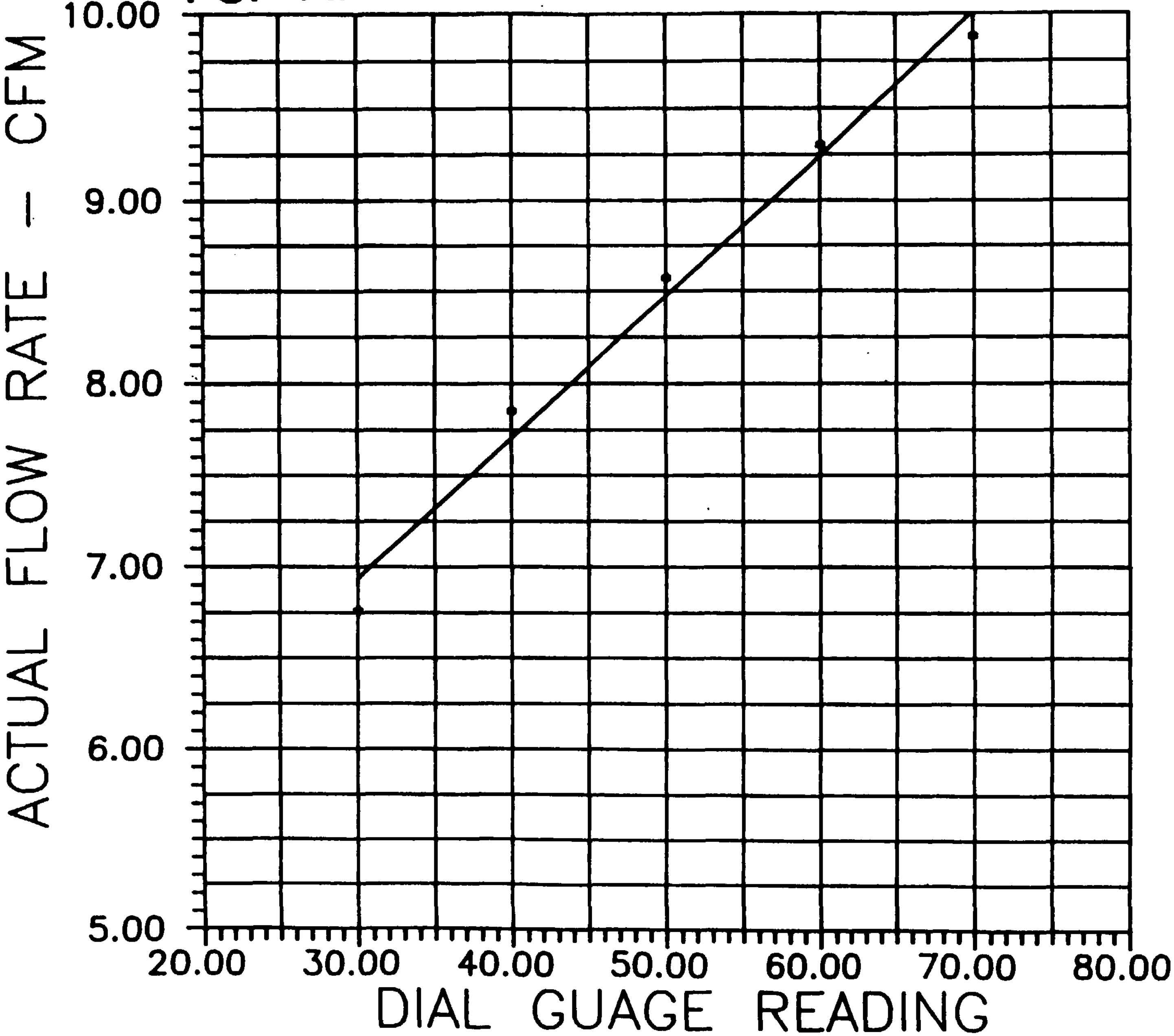
PS-1 Shelter No.: EE-3 **Station Pressure:** 30.02

GMW Model 40 OCU No.: 45-C

Magnehelic Gauge Reading	Manometer Reading (in. H_2O)	OCU Flow-Rate (tcfm)	Temp. (°C)
70	3.8/3.6		64°F
60	3.4/3.2		"
50	2.9/2.7		"
40	2.4/2.3		"
30	1.8/1.7		"

Comments: wind speed 8 mph
direction 220° (sw)

PUF AIR SAMPLER CALIBRATION - EE2



y = .7566 – 10578

GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/15/87

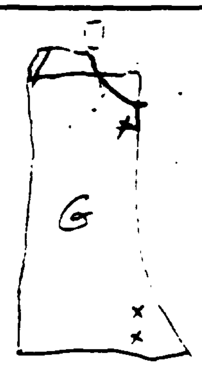
Site Address: BEAR CREEK - SITE G

PS-1 Shelter No.: EE-4 Station Pressure: 30.02

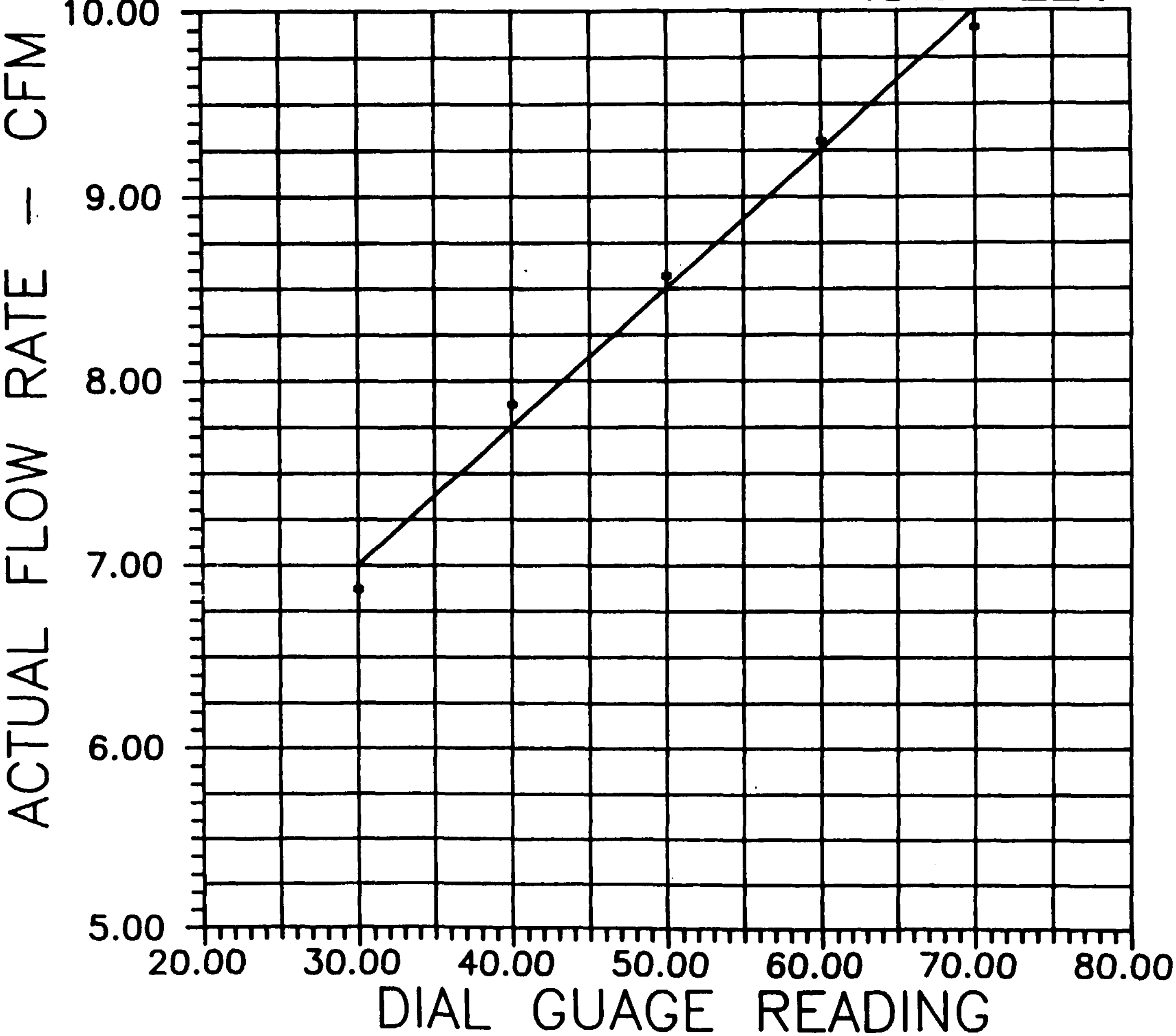
GMW Model 40 OCU No.: 45-C

Magnehelic Gauge Reading	Manometer Reading (in. H_2O) HIGH / LOW	OCU Flow-Rate (tcfm)	Temp. (^{o}C)
70''	3.7 / 3.7		64°F
60	3.3 / 3.3		''
50	2.8 / 2.8		''
40	2.3 / 2.4		''
30	1.8 / 1.8		''

Comments: WIND SPEED 8 MPH
DIRECTION 230° (SW)



PUF AIR SAMPLER CALIBRATION - EE4



y= .[illegible] G -1.356

GMW MODEL PS-1 CALIBRATION FORM

Name: D SEWALL Date: 7/15/87

Site Address: BEAR CREEK - SITE G

PS-1 Shelter No.: EE-5 Station Pressure: 30.02

GMW Model 40 OCU No.: 45C

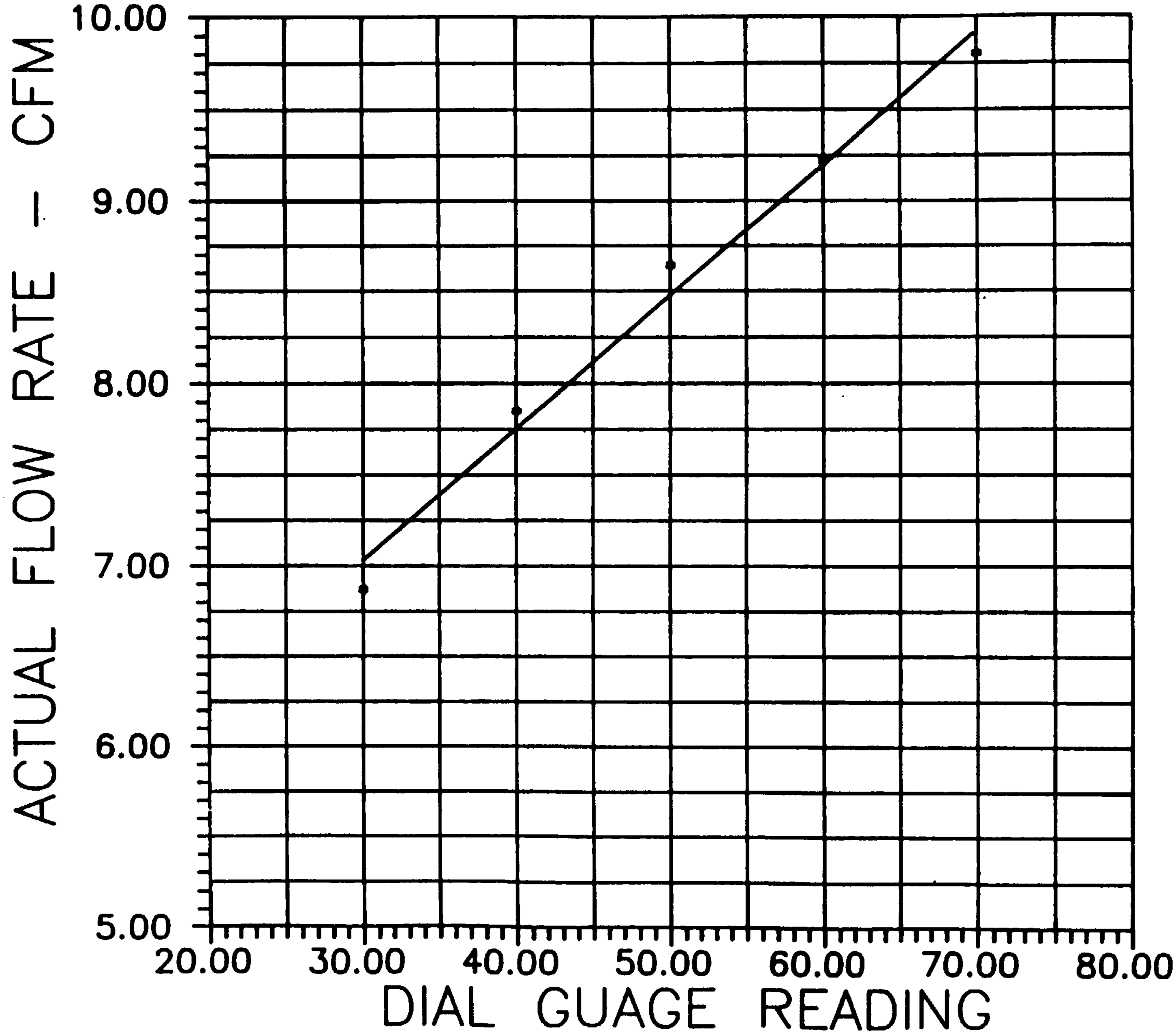
Magnehelic Gauge Reading	Manometer Reading (in. H_2O)	OCU Flow-Rate (tcfm)	Temp. (^oC)
70	3.7/3.6		64°F
60	3.3/3.2		"
50	2.9/2.8		"
40	2.4/2.3		"
30	1.5/1.8		"

Comments: WIND SPEED 8 MPH

DIRECTION 220° (SW)

y= .196 G - 1.43

PUF AIR SAMPLER CALIBRATION - EE5



GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/15/87

Site Address: BEAR CREEK - SITE 6

PS-1 Shelter No.: EE-6 Station Pressure: 30.02

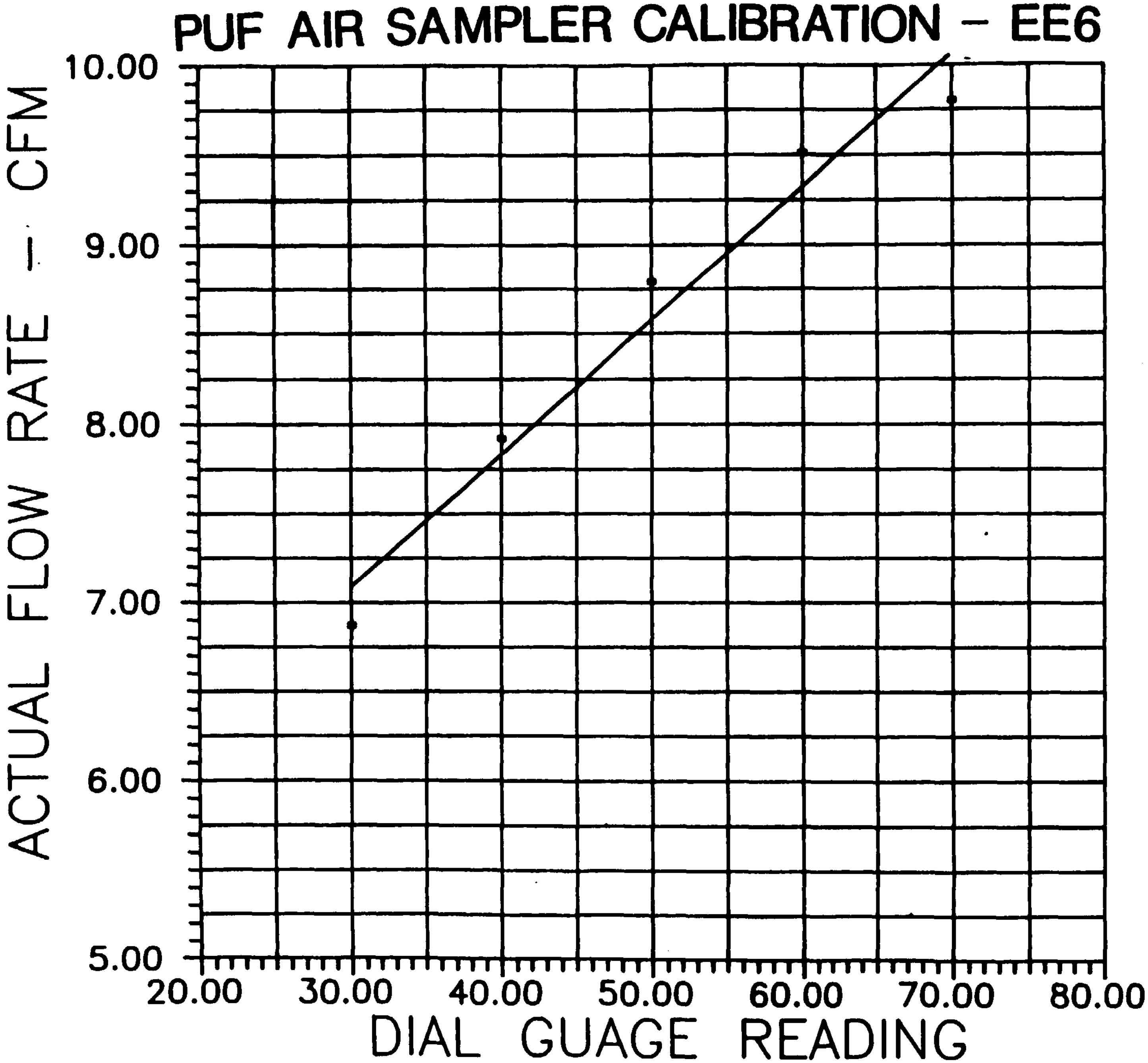
GMW Model 40 OCU No.: 45-C

Magnehelic Gauge Reading	Manometer Reading (in. H_2O)		OCU Flow-Rate (tcfm)	Temp. (^{o}C)
~~70~~ 65 68	3.7/3.6	6		64°F
60	3.5/3.4	5.8		"
50	3.0/2.9	6.1		"
40	2.4/2.4	56		"
30	1.8/1.8	5.4		"

Comments: WIND SPEED 8 MPH

DIRECTION 220° (SW)

y = 0.764 c - 1.23



PUF AIR SAMPLER CALIBRATION - EE6
ACTUAL FLOW RATE - CFM
10.00
9.00
8.00
7.00
6.00
5.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
DIAL GUAGE READING

GMW MODEL PS-1 CALIBRATION FORM

Name: A. Sewall Date: 7/15/87

Site Address: Dead Creek - Site G

PS-1 Shelter No.: EE-1 Station Pressure: 30.02

GMW Model 40 OCU No.: 45-C

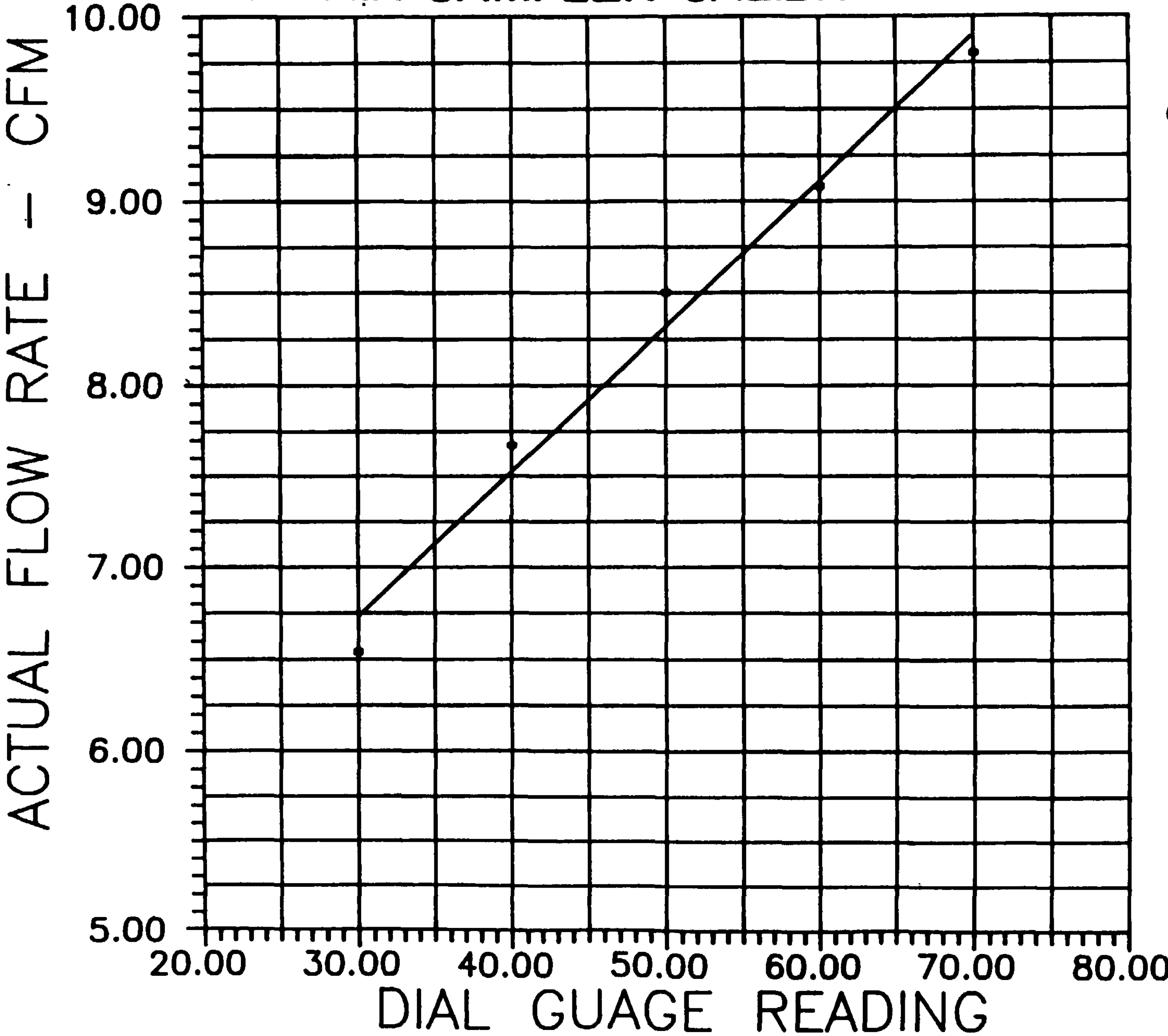
Magnehelic Gauge Reading	Manometer Reading (in. H_2O)	OCU Flow-Rate (tcfm)	Temp. (°C)
70	3.7/3.6 ~~3.6/3.6~~ ATS		64°F
60	3.2/3.1		
50	2.8/2.7		
40	2.3/2.2		
30	1.7/1.6		

Comments: Wind Speed 2 mph

Direction 220° (SW)

RH: 73%

PUF AIR SAMPLER CALIBRATION - EE1



y = 0 725 [illegible] −3.66

[illegible]

GMW MODEL PS-1 CALIBRATION FORM

WIND 210° 9 MPH

Name: A. SEWALL Date: 7/20/87

Site Address: ALUM CREEK - SITE Q/R

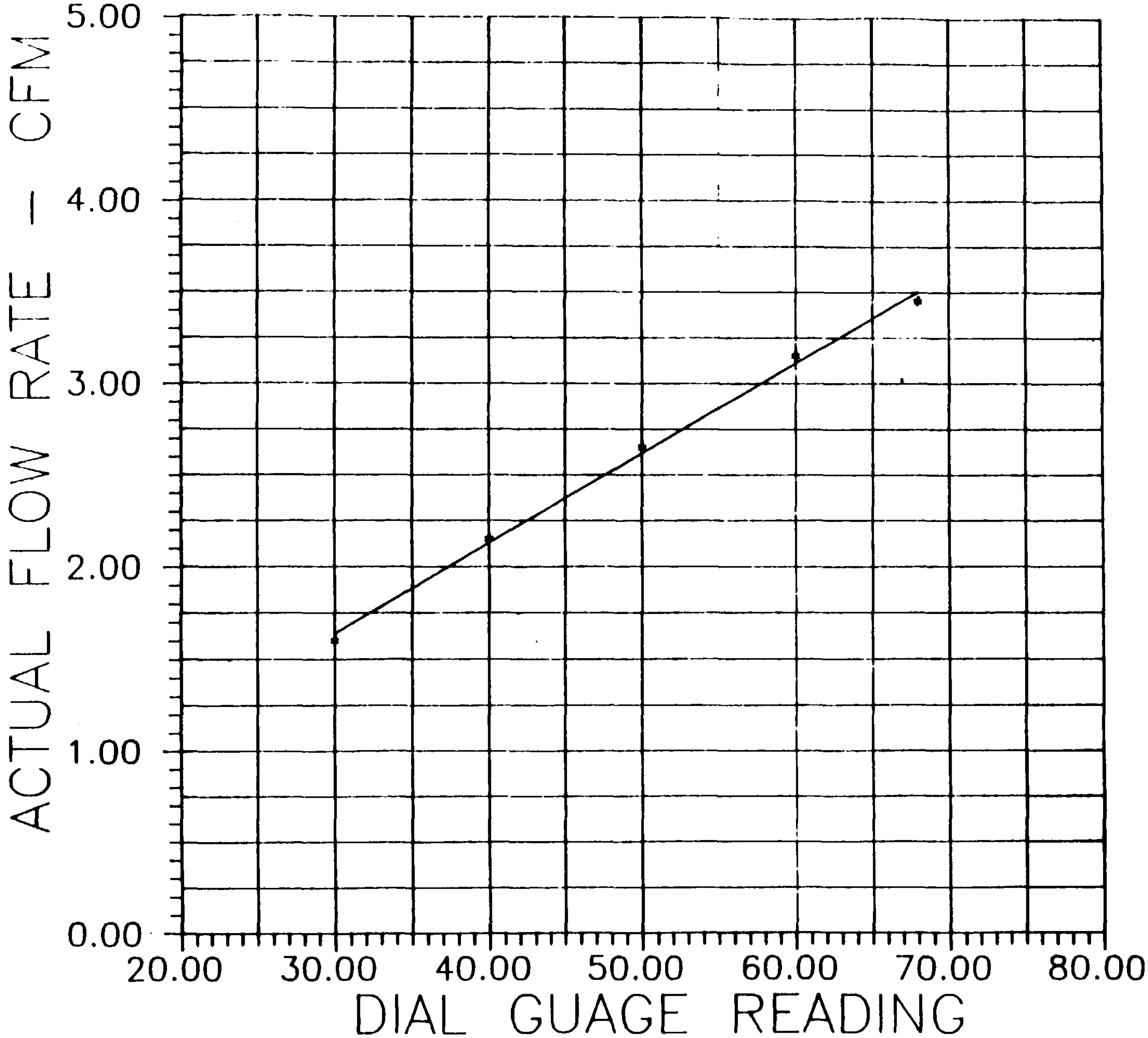
PS-1 Shelter No.: EE-1 Station Pressure: 30.21 =

GMW Model 40 OCU No.: 45-C

Magnehelic Gauge Reading	Manometer Reading (in. H_2O)	OCU Flow-Rate (tcfm)	Temp. (°C)
~~78~~ ~~63~~ 68	~~32/3.1~~ 1 ATE 35/3.4		89°F
60	32/3.1		
50	27/2.6		
40	22/2.1		
30	1.6/1.6		

Comments:

PUF AIR SAMPLER CALIBRATION - EE1



GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/20/87

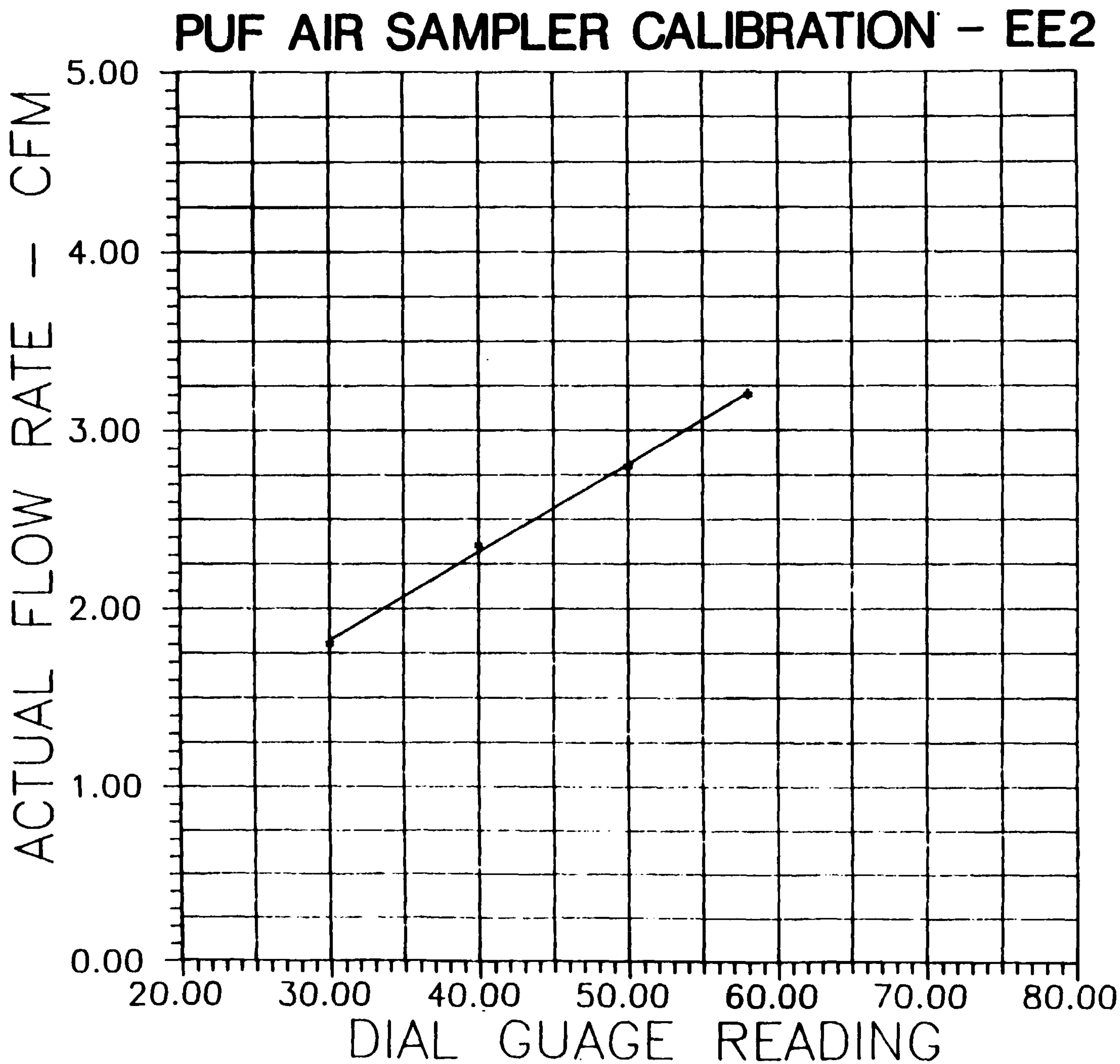
Site Address: MEAD CREEK - SITE Q/R

PS-1 Shelter No.: EE-Q Station Pressure: 30.21

GMW Model 40 OCU No.: 45-C

Magnehelic Gauge Reading	Manometer Reading (in. H_2O)	OCU Flow-Rate (tcfm)	Temp. (°C)
			89°F
58 ~~60~~	3.2/3.2		
50	2.8/2.8		
40	2.4/2.3		
30	1.8/1.8		

Comments:



PUF AIR SAMPLER CALIBRATION - EE2
ACTUAL FLOW RATE - CFM
5.00
4.00
3.00
2.00
1.00
0.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
DIAL GUAGE READING

GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/20/87

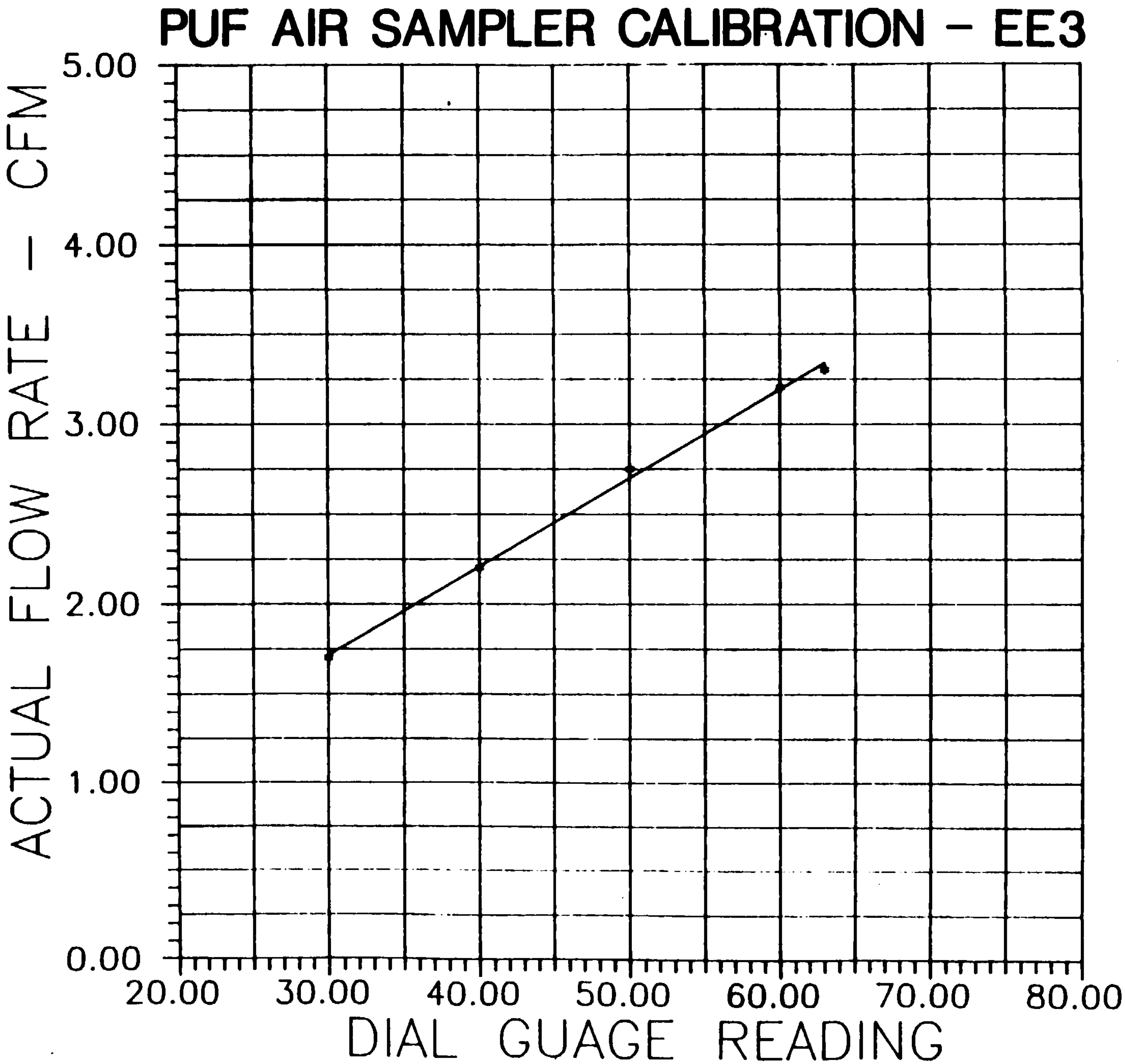
Site Address: NEAR CREEK - SITE Q/R

PS-1 Shelter No.: EE-3 Station Pressure: 30.21

GMW Model 40 OCU No.: US-C

Magnehelic Gauge Reading	Manometer Reading (in. H_2O)	OCU Flow-Rate (tcfm)	Temp. (^oC)
63	3.3/3.3		89°F
60	3.2/3.2		
50	2.8/2.7		
40	2.2/2.2		
30	1.7/1.7		

Comments:


PUF AIR SAMPLER CALIBRATION - EE3
ACTUAL FLOW RATE - CFM
5.00
4.00
3.00
2.00
1.00
0.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
DIAL GUAGE READING

GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/20/87

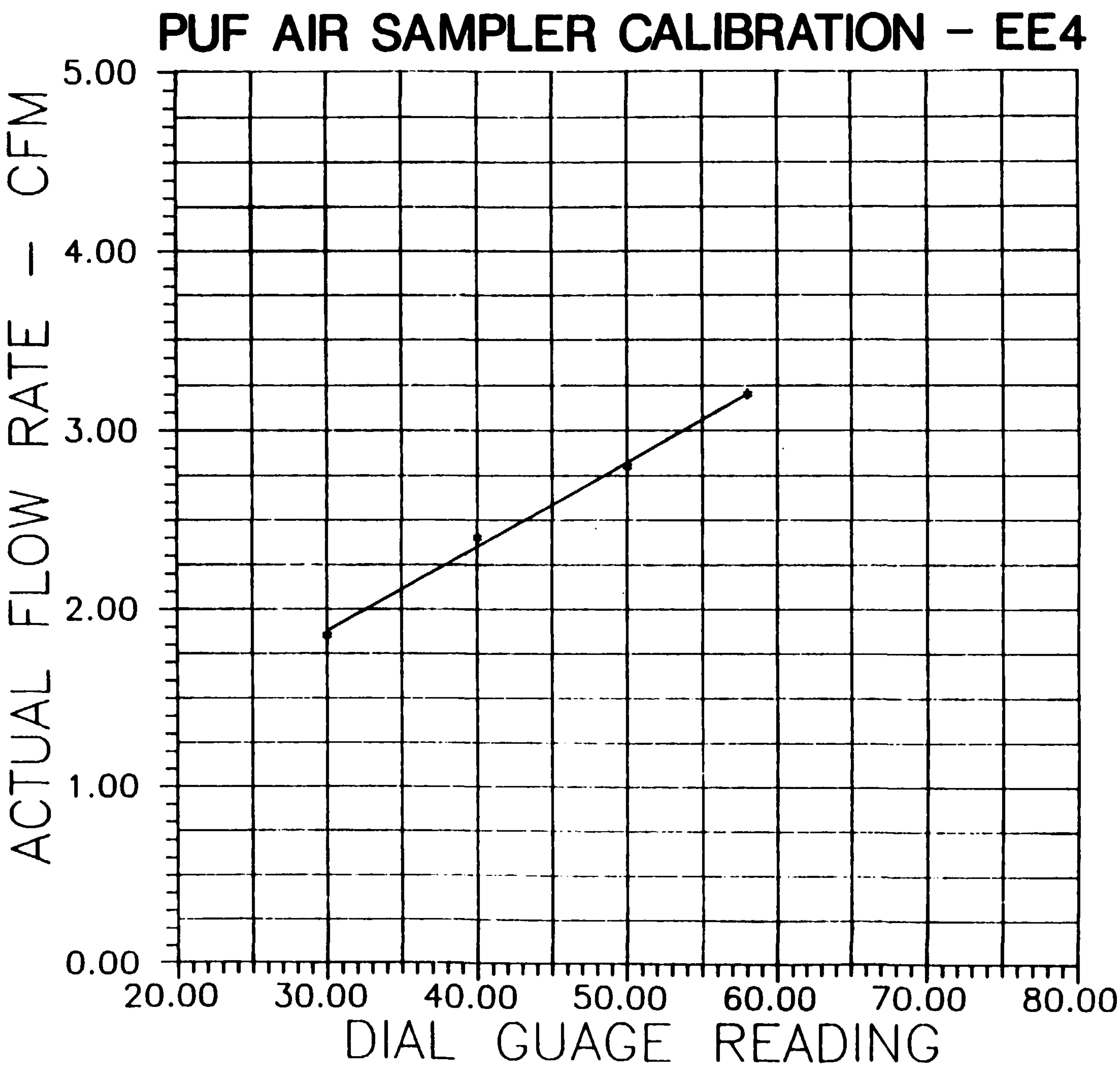
Site Address: LEAD CREEK - SITE Q/R

PS-1 Shelter No.: EE-4 Station Pressure: 30.21

GMW Model 40 OCU No.: 45-C

Magnehelic Gauge Reading	Manometer Reading (in. H_2O)	OCU Flow-Rate (tcfm)	Temp. (^oC)
			89°F
58 ~~60~~	3.3/3.1		
50	2.9/2.7		
40	2.4/2.3		
30	1.9/1.8		

Comments:


PUF AIR SAMPLER CALIBRATION - EE4
ACTUAL FLOW RATE - CFM
5.00
4.00
3.00
2.00
1.00
0.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
DIAL GUAGE READING

GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/20/87

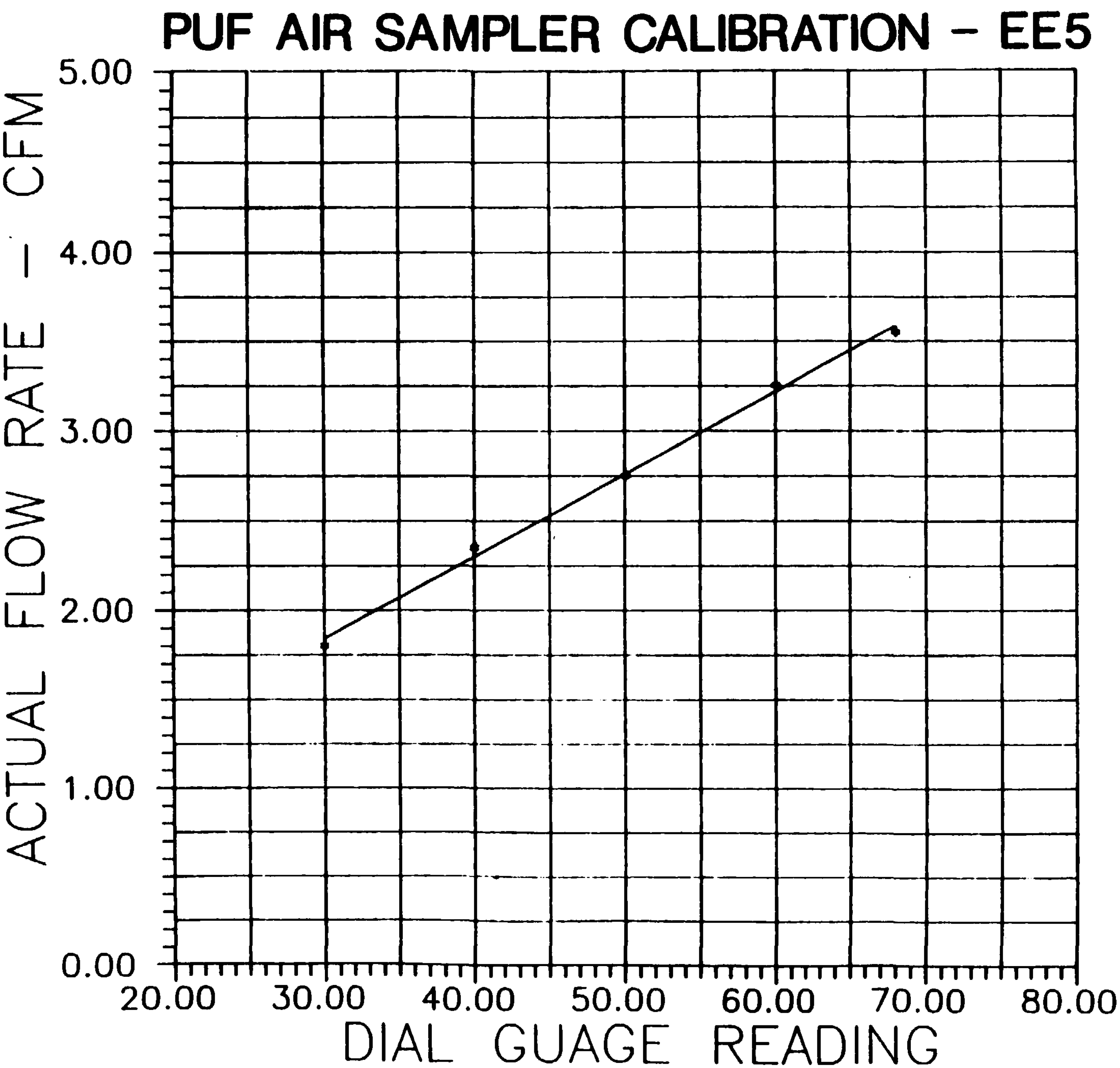
Site Address: AEPA CREEK - SITE Q/R

PS-1 Shelter No.: EE-5 Station Pressure: 30.21

GMW Model 40 OCU No.: 45-C

Magnehelic Gauge Reading	Manometer Reading (in. H_2O)	OCU Flow-Rate (tcfm)	Temp. (°C)
65	3.6/3.5		59°F
60	3.3/3.2		
50	2.8/2.7		
40	2.4/2.3		
30	1.8/1.8		

Comments:


PUF AIR SAMPLER CALIBRATION - EE5
ACTUAL FLOW RATE - CFM
5.00
4.00
3.00
2.00
1.00
0.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
DIAL GUAGE READING

GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/20/87

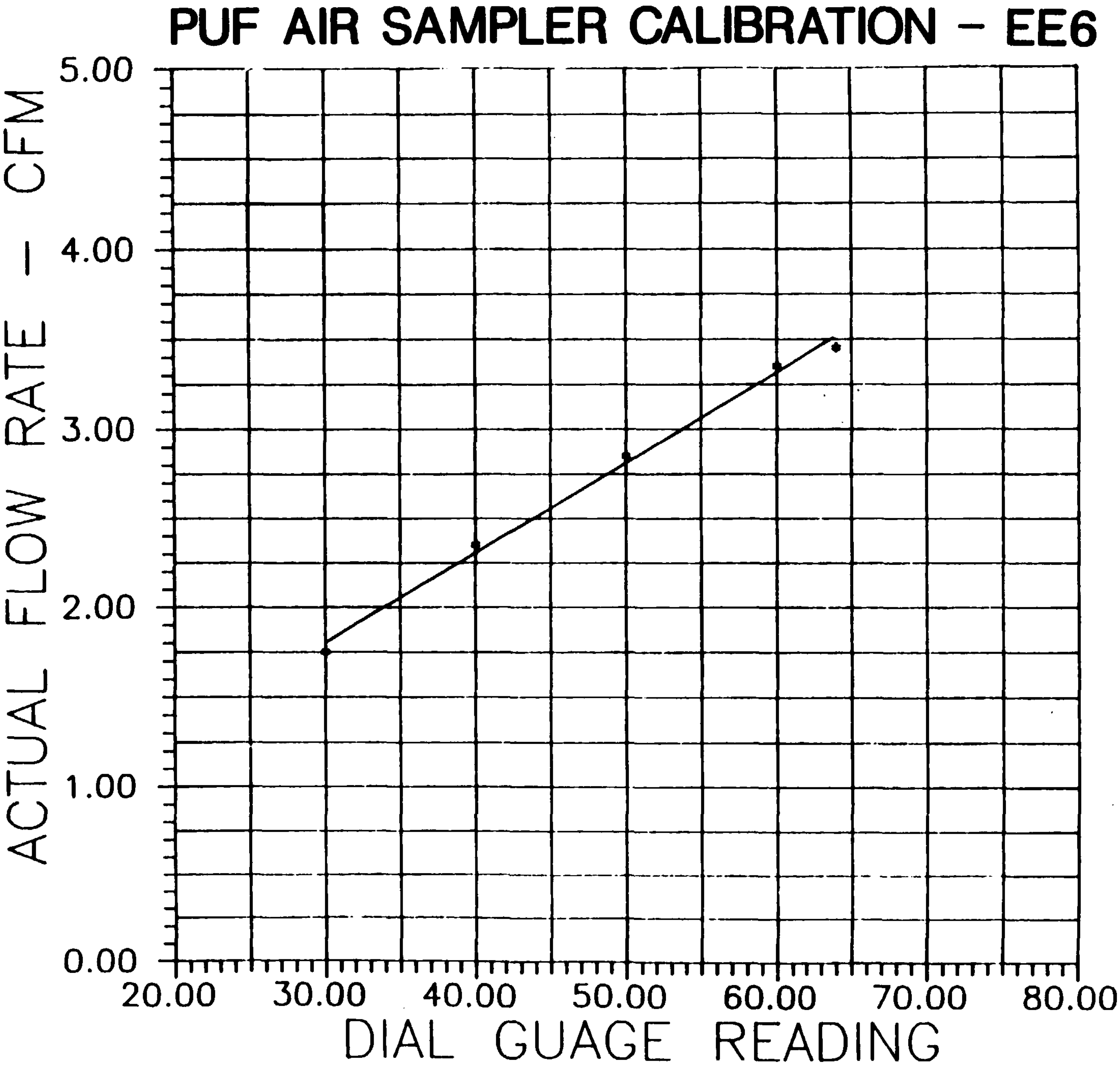
Site Address: NEAR CREEK - SITE Q/R

PS-1 Shelter No.: EE-6 Station Pressure: 30.21

GMW Model 40 OCU No.: 45-C

Magnehelic Gauge Reading	Manometer Reading (in. H_2O)	OCU Flow-Rate (tcfm)	Temp. (^oC)
64	3.5/3.4		89°F
60	3.4/3.3		
50	2.9/2.8		
40	2.4/2.3		
30	1.8/1.7		

Comments:



PUF AIR SAMPLER CALIBRATION - EE6
ACTUAL FLOW RATE - CFM
5.00
4.00
3.00
2.00
1.00
0.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
DIAL GUAGE READING

GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/22/87

Site Address: DEAD CREEK - SITES Q/R

PS-1 Shelter No.: EE-1 Station Pressure: ________

GMW Model 40 OCU No.: 45-C

Magnehelic Gauge Reading	Manometer Reading (in. H_2O)	OCU Flow-Rate (tcfm)	Temp. (^oC)
*			

Comments: * NO END CALIBRATION FOR EE-1 DUE TO MOTOR FAILURE.

GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL   Date: 7/22/87

Site Address: DEAD CREEK SITES Q/R

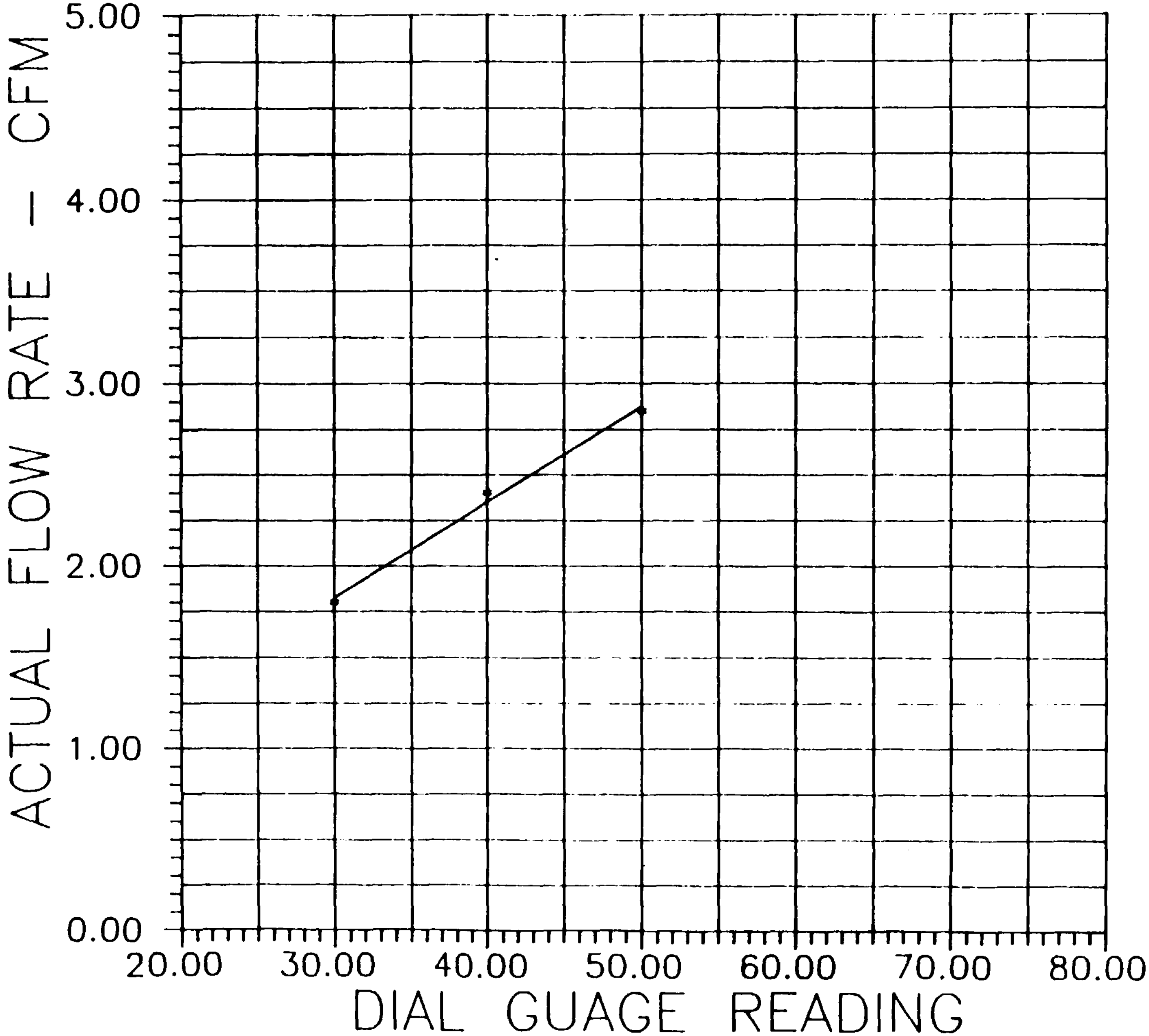
PS-1 Shelter No.: EA-2   Station Pressure: 30.10

GMW Model 40 OCU No.: 75-C

Magnehelic Gauge Reading	Manometer Reading (in. H_2O)	OCU Flow-Rate (tcfm)	Temp. (°C)
50	2.9/2.8		86°
40	2.4/2.4		
30	1.8/1.8		

Comments: GAUGE READING 50 AT START OF TEST WITH VALVE OPEN.

PUF AIR SAMPLER CALIBRATION - EE2



GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/22/87

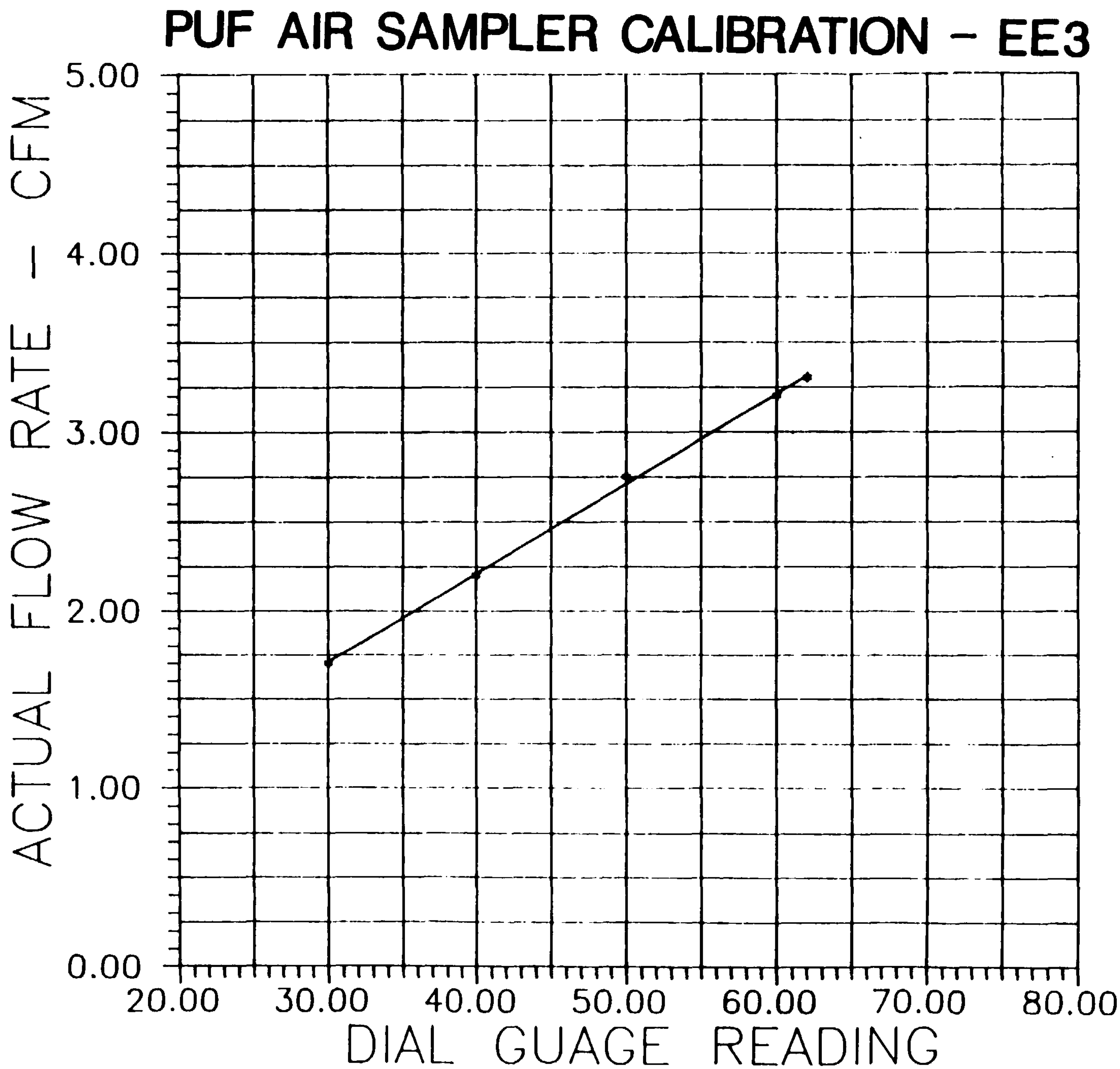
Site Address: ARM CREEK SITES Q/R

PS-1 Shelter No.: EE-3 Station Pressure: 30.10

GMW Model 40 OCU No.: 45-C

Magnehelic Gauge Reading	Manometer Reading (in. H_2O)	OCU Flow-Rate (tcfm)	Temp. (^oC)
62	3.2/3.3		86
60	3.2/3.2		
50	2.8/2.8		
40	2.2/2.2		
30	1.7/1.7		

Comments:


PUF AIR SAMPLER CALIBRATION - EE3
ACTUAL FLOW RATE - CFM
0.00
1.00
2.00
3.00
4.00
5.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
DIAL GUAGE READING

GMW MODEL PS-1 CALIBRATION FORM

Name: A. SAWALL Date: 7/22/87

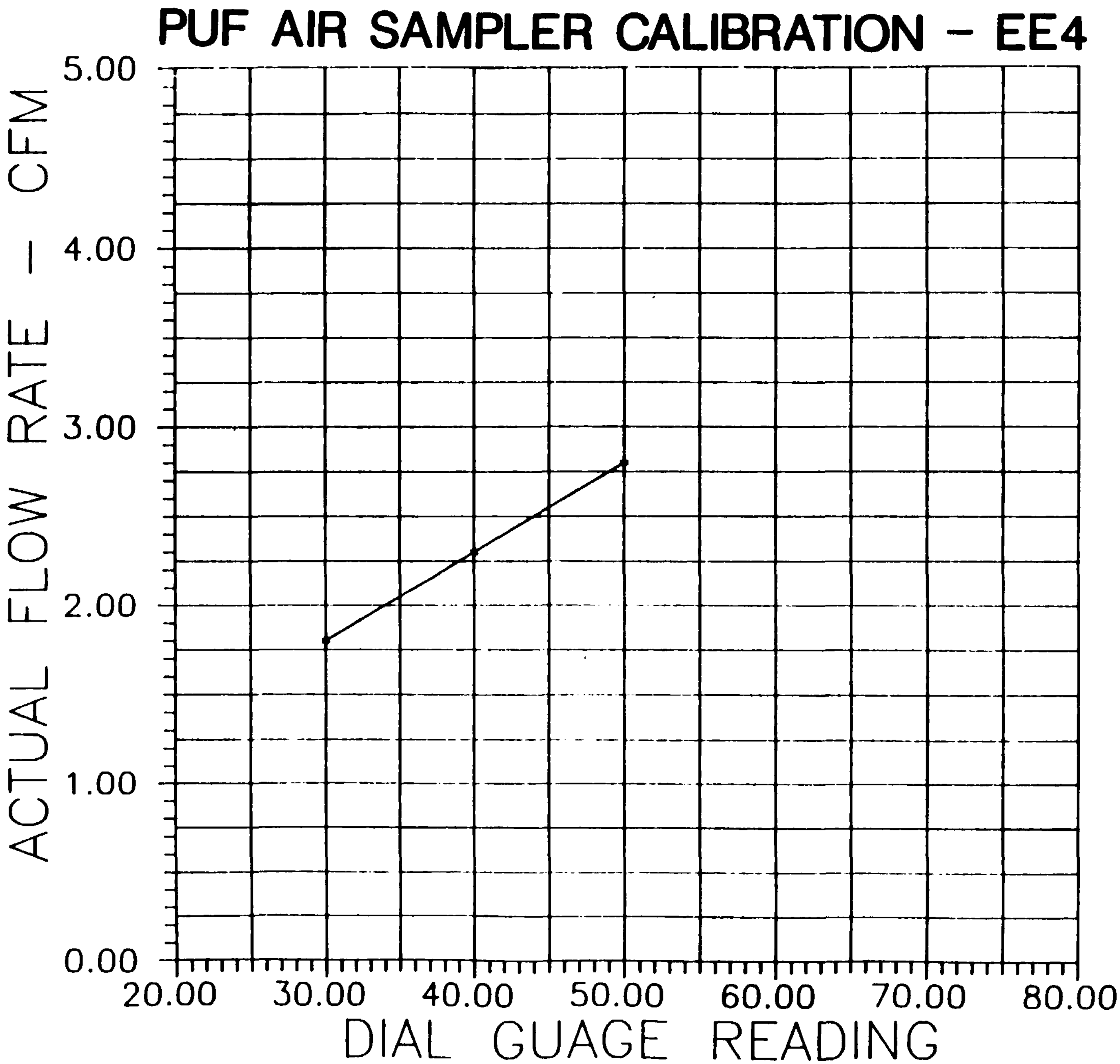
Site Address: ARM CREEK - SITES Q/R

PS-1 Shelter No.: EA-4 Station Pressure: 30.10

GMW Model 40 OCU No.: 45-C

Magnehelic Gauge Reading	Manometer Reading (in. H_2O)	OCU Flow-Rate (tcfm)	Temp. (°C)
50	2.8/2.8		86°
40	2.3/2.3		↓
30	1.8/1.8		↓

Comments:


PUF AIR SAMPLER CALIBRATION - EE4
ACTUAL FLOW RATE - CFM
5.00
4.00
3.00
2.00
1.00
0.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
DIAL GUAGE READING

GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/22/87

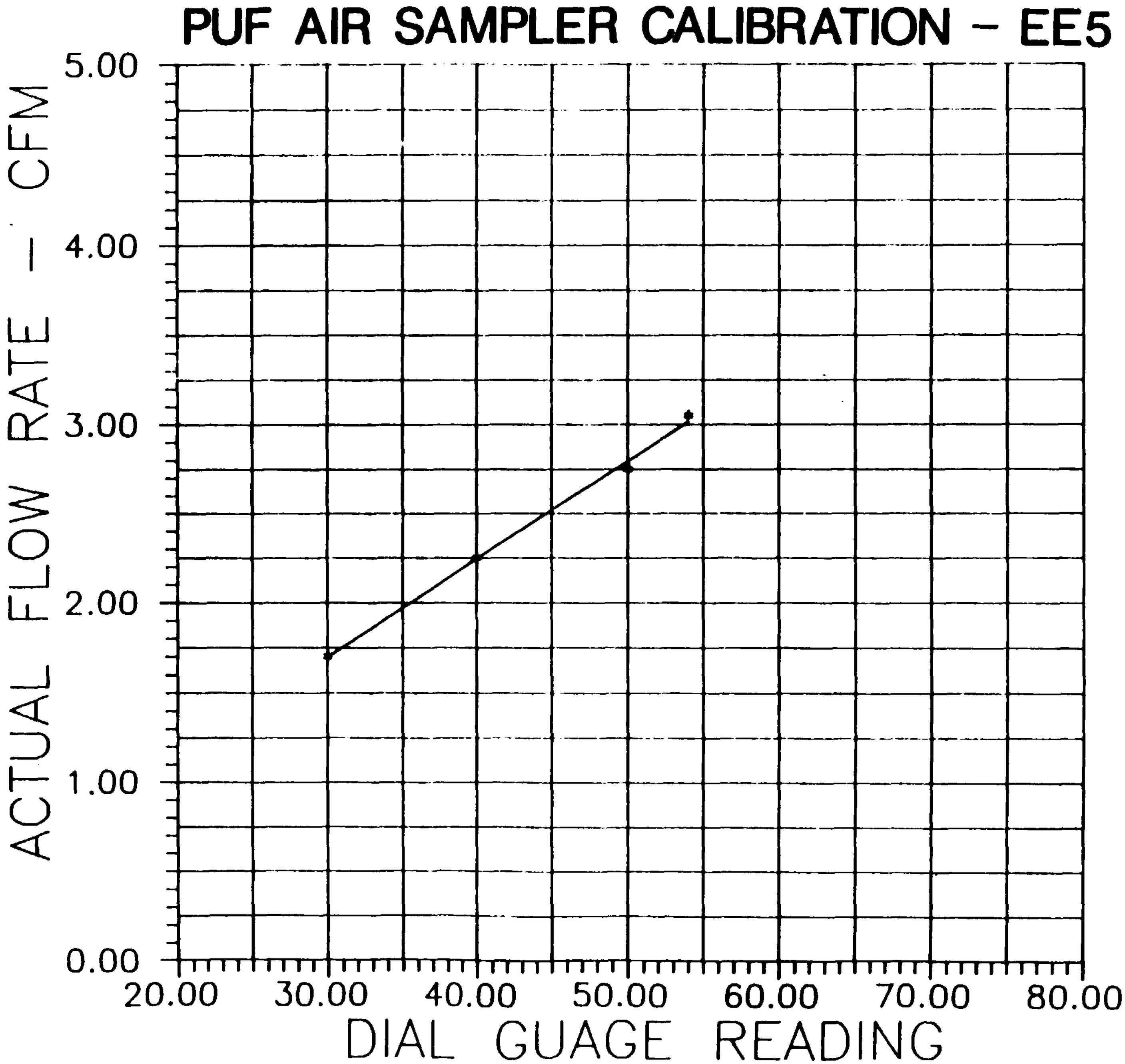
Site Address: DEAD CREEK - SITES Q/R

PS-1 Shelter No.: EE-5 Station Pressure: 30.10

GMW Model 40 OCU No.: 45-C

Magnehelic Gauge Reading	Manometer Reading (in. H_2O)	OCU Flow-Rate (tcfm)	Temp. (^oC)
54	3.0/3.1		86°
50	2.8/2.7		
40	2.3/2.2		
30	1.7/1.7		

Comments:


PUF AIR SAMPLER CALIBRATION - EE5
ACTUAL FLOW RATE - CFM
5.00
4.00
3.00
2.00
1.00
0.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
DIAL GUAGE READING

GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/22/87

Site Address: DEAD CREEK - SITES Q/R.

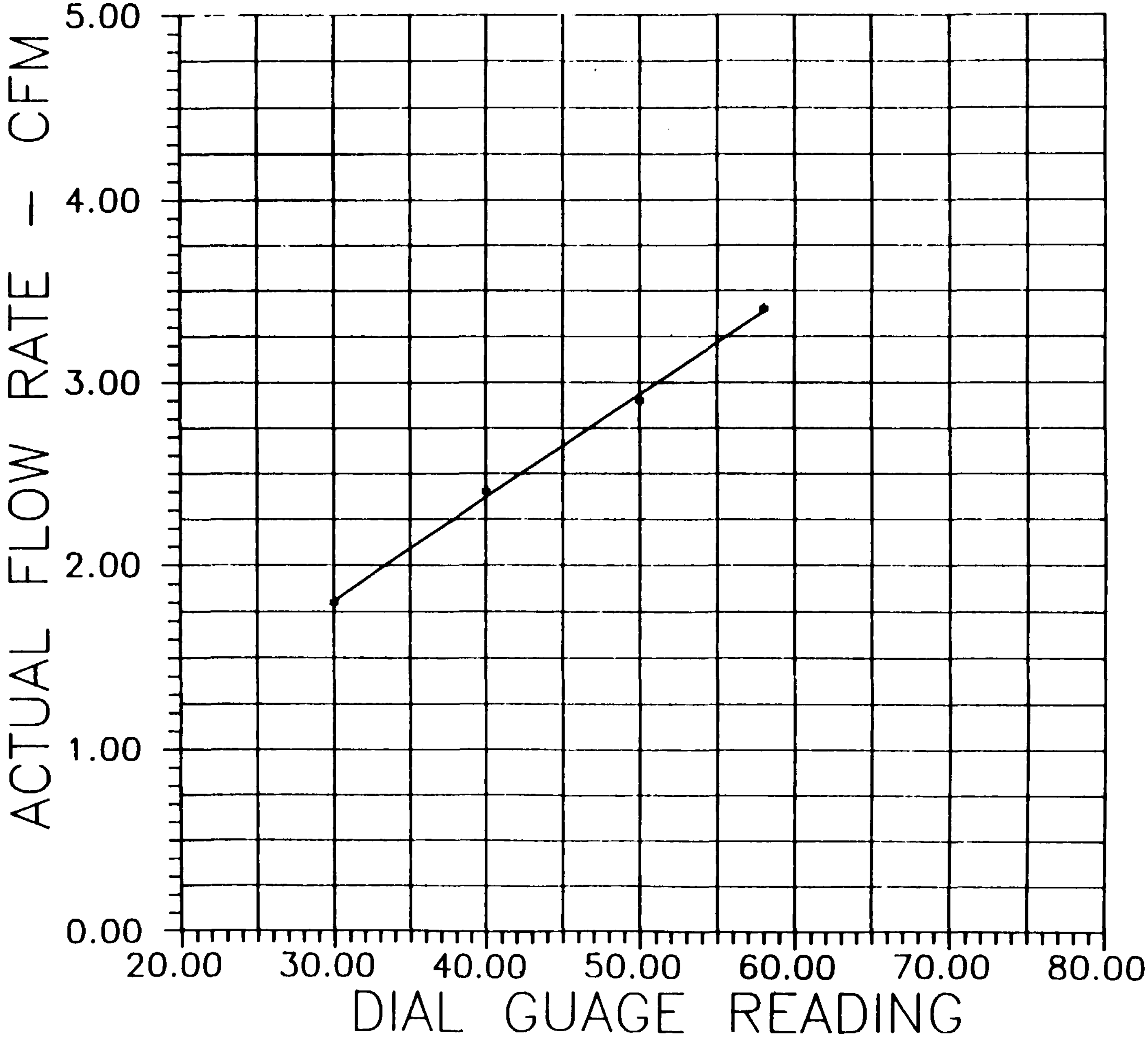
PS-1 Shelter No.: EE-6 Station Pressure: 30.10

GMW Model 40 OCU No.: 45-C

Magnehelic Gauge Reading	Manometer Reading (in. H_2O)	OCU Flow-Rate (tcfm)	Temp. (°C)
58	3.4/3.1		86°
50	2.9/2.9		
40	2.4/2.4		
30	1.8/1.8		

Comments:

PUF AIR SAMPLER CALIBRATION - EE6



High Volume Sampler

Air Volume Calculations

Table for the Calculation Air vol.(1) Calculated by
at standard temperature and pressure 10-21-87

Summary Data

Case #	site	shelter No.	Date	Sample Time Elapse Time (min)	Total Air vol. cu.ft. standard Temp./press.	Air volume Cubic meter $\frac{1}{35.1}$ cubic
DC-01	G	EE-1	7-16-87	733.6	3968	113.05
DC-02	〃	EE-2	〃	709.4	3598	102.51
DC-03	〃	EE-3	〃	718.6	3695	105.27
DC-04	〃	EE-4	〃	739.9	4017	114.44
DC-05	〃	EE-5	〃	668.6	3582	102.05
DC-06	〃	EE-6	〃	652	3351	95.47
DC-07		Blank				
DC-10	G	EE-1	7-17-87	621.5	3160	90.03
DC-8	〃	EE-2	〃	719.3	3794	108.09
DC-9	〃	EE-3	〃	740.2	3531	100.60
DC-13	〃	EE-4	〃	740.7	4019	114.50
DC-12	〃	EE-5	〃	733.5	3671	104.59
DC-11	〃	EE-6	〃	556.6	2899	82.59
DC-20	G/R	EE-1	7-21-87	714.4	4055	115.53
DC-15	〃	EE-2	〃	566.5	3048	86.84
DC-16	〃	EE-3	〃	721.9	3668	104.50
DC-17	〃	EE-4	〃	566.5	2959	84.30
DC-19	〃	EE-5	〃	910.6	ID	—
DC-18	〃	EE-6	〃	711.4	4135	117.81
DC-27	G/R	EE-1	7-22-87	ID	—	—
DC-22	〃	EE-2	〃	622	3246	92.48
DC-23	〃	EE-3	〃	742.2	4135	117.81
DC-24	〃	EE-4	〃	621.9	2899	82.59
DC-26	〃	EE-5	〃	722.1	3927	111.88
DC-25	〃	EE-6	〃	735	3898	111.05
-28		Blank				

ID: Inaccurate Data

(1) orifice Transfer standard cal. $Q_{std} = \frac{1}{0.28}\left[\sqrt{\Delta H \cdot \frac{P}{P_{std}} \cdot \frac{T_{std}}{T}} + 0.0156\right]$

Site DEAD CREEK - SITE G Date 7/17/87 Performed by D. SEWALL

Sampler S/N	Sampling Location I.D.	New Filter (√)	PUF Cart. No.	Venturi Setting	Clock Time			Sampler Timer			Venturi Readings Time/Magnehelic in. H_2O				Ambient Temperature, °F		Barometric Pressure mm Hg		Comments
					Start, hr CDT	Stop, hr CDT	Min Elapsed	Start, min	Stop, min	Min Elapsed	START 1	1100 2	1630 3	4	Start	Stop	Start	Stop	
EE-1	NE CORNER	✓			0600	1837	757	812.3	14238	621.5	53	33	32	33	69	85	30.14	30.10	~~AC-08~~ AC-10
EE-2	E. AC FENCE	✓			0610	1811	721	728.9	14482	719.3	44	37	34	34	69	85	30.14	30.10	AC-08
EE-3	NE (CORRAL)	✓			0608	1832	744	740.2	14804	740.2	38	30	28	28	69	85	30.14	30.10	AC-09
EE-4	NW CORNER	✓			0557	1827	750	778.3	15190	740.7	47	37	36	36	69	85	30.14	30.10	AC-13 (NOCCLUPT)
EE-5	SW-BKG	✓			0553	1820	747	684.7	14182	733.5	44	36	34	35	69	85	30.14	30.10	AC-12
EE-6	NE CORNER	✓			0602	1838	756	678.9	12355	556.6	40	36	34	32	69	85	30.14	30.10	AC-11 (COLLOCATED)

WEATHER: HI VOL - START: WIND SE (140°) 8 MPH, 69°F, 30.14, DEW PT 65 (0700)
MIDDLE: WIND SW (180°) 8 MPH, 80°F, 30.10 (1000)
STOP: WIND SE (150°) 8 MPH, 85°F, 30.10, DEW PT 70 (1640)

LO VOL START - WIND SW (190°) 10 MPH, 76°F, 30.10, (0900)
MIDDLE - WIND SW (190°) 10 MPH 84°F, 30.14, (1240)
STOP - WIND S (180°) 12 MPH, 88°F, 30.10, (1620) DEW PT 69

(a) Record any evidence of tampering with sampler and/or abnormalities in sampler operation, PUF cartridge condition or handling, etc.

Data Checked By ______________________ Date __________

FIGURE 4. TYPICAL SAMPLING DATA FORM FOR HIGH VOLUME PESTICIDE/PCB SAMPLER

Site: DEAD CREEK · SITES Q/R   Date: 7/21/87   Performed by: [illegible] SEWALL

Sampler S/N	Sampling Location I.D.	New Filter (√)	PUF Cart. No.	Venturi Setting	Clock Time: Start, hr CDT	Clock Time: Stop, hr CDT	Clock Time: Min Elapsed	Sampler Timer: Start, min	Sampler Timer: Stop, min	Sampler Timer: Min Elapsed	Venturi Readings Time/Magnehelic in. H2O: START	10:30	14:30	[illegible]	Ambient Temperature, °F: Start	Ambient Temperature, °F: Stop	Barometric Pressure: Start	Barometric Pressure: Stop	Comments[a]
EE-1	SE PORTION	√			0702	1904	722	1425.8	2150.2	714.4	56	46	46	44	73	87	30.23	30.17	DC-20
EE-2	NW PORTION	√			0633	1920	767	1451.2	2017.7	566.5	46	40	36	34	73	87	30.23	30.17	DC-15
EE-3	NE CORNER	√			0627	1834	727	1486.7	2208.6	721.9	42	35	33	36	73	87	30.23	30.17	DC-16
EE-4	NW PORTION	√			0632	1918	766	1521.5	2088	566.5	46	36	32	32	73	87	30.23	30.17	DC-17 CO-LOCATED
EE-5	[illegible]	√			0640	[illegible]	729	1420.2	2330.8	910.6	4[illegible]	40	40	41	73	87	30.23	30.17	DC-19
EE-6	SW BKG	√			0654	1911	737	1237.6	1949.0	711.4	44	40	34	34	73	87	30.23	30.17	DC-18

WEATHER - HI VOL START: WIND SW (220°) 6 MPH, 73°F, 30.23 (0720)
MIDDLE: WIND SW (200°) 8 MPH, 86°F, 30.26 (1140)
END: WIND SW (210°) 7 MPH, 87°F, 30.17 (1730)

LOW VOL START: WIND SE (160°) 5 MPH, 84°F, 30.25 (0730)
MIDDLE: WIND SW (200°) 8 MPH, 86°F, 30.26 (1140)
END: WIND S (180°) [illegible] MPH, 88°F, 30.17 (1730)

[a] Record any evidence of tampering with sampler and/or abnormalities in sampler operation, PUF cartridge condition or handling, etc.

Data Checked By: ______________________   Date: ______________

TO4-20

FIGURE 4. TYPICAL SAMPLING DATA FORM FOR HIGH VOLUME PESTICIDE/PCB SAMPLER

GENERATOR (Yellow one) ON EE-5 BROKE DOWN 5 MIN. AFTER START UP (FLOW CHANGE). REPLACED GENERATOR.

FAULT ON LOW VOL AMP @ EE 4 AT 10:30 AM

F[illegible] ON LOW VOL AMP @ EE-3 AT 10:4[illegible] a.m.

Site: DEAD CREEK - SITES Q/R Date: 7/22/87 Performed by: D. SEWALL

Sampler I/D	Sampling Location I.D.	New Filter (✓)	PUF Cart. No.	Vortex Setting	Clock Time: Start, hr CDT	Clock Time: Stop, hr CDT	Clock Time: Min Elapsed	Sampler Timer: Start, min	Sampler Timer: Stop, min	Sampler Timer: Min Elapsed	Venturi Readings Time/Magnehelic in H_2O: 1	1300	1500	4	Ambient Temperature °F: Start	Ambient Temperature °F: Stop	Barometric Pressure mm Hg: Start	Barometric Pressure mm Hg: Stop	Comments
EE-1	SE CORNER	✓			0627	—	—	2150	2304.6	154.6*	58	—	~~[illegible]~~	—	74	86	30.21	30.10	DC-27 *MOTOR BREAKDOWN
EE-2	NW CORNER	✓			0608	1914	786	2019.0	2641	622	38	35	33	36	74	86	30.21	30.10	DC-22
EE-3	NE CORNER	✓			0635	1857	742	2208.6	2950.8	742.2	54	42	40	40	74	86	30.21	30.10	DC-23
EE-4	NW CORNER	✓			0607	1913	786	2089.1	2711	621.9	32	24	24	28	74	86	30.21	30.10	DC-24 CO-LOCATED
EE-5	SW VERTICAL CORNER	✓			0614	1826	732	2331.2	3053.3	722.1	47	38	37	37	74	86	30.21	30.10	DC-26
EE-6	SW BACKGROUND	✓			0621	1841	740	1948.2	2683.2	735	46	35	34	35	74	86	30.21	30.10	DC-25
BLANK	—																		DC-28

WEATHER: HI VOL START - WIND SE (100°) 6 MPH 74°F; 30.21 (0730)
MIDDLE - WIND SE (100°) [illegible] MPH 90°F 30.17 (1310)
END - WIND S (180°) 12 MPH 86°F 30.10

LOW VOL START - WIND 110° SE 8 MPH 84°F, 30.22 (0915)
MIDDLE - SEE HI-VOL ABOVE
END - WIND S (180°) 13 MPH, 87°F, 30.09 (1700)

(a) Record any evidence of tampering with sampler and/or abnormalities in sampler operation, PUF cartridge condition or handling, etc.

Data Checked By ______________________ Date ____________

FIGURE 4. TYPICAL SAMPLING DATA FORM FOR HIGH VOLUME PESTICIDE/PCB SAMPLER

0600 WIND NE 0-5

* MOTOR ON EE-1 WENT DOWN @ ~ 9:00 A.M. FOR AN UNKNOWN REASON.
ARMATURE TEETH & BRUSHES BROKEN - NOT REPAIRABLE AT THIS TIME.
TOTAL SAMPLE TIME AT EE-1 154.6 MIN.

steps for the calculation of linear relation between manometer data and flow rate — page 1

$$V_{std} = V_m * \frac{P_1 - \Delta P}{P_{STD}} * \frac{(\overset{537}{T_{STD}+460})}{(\underbrace{T_1+460}_{524})} \quad 1.025$$

$\begin{cases} T_{STD} = 77^\circ F \\ T_1 = 64 \end{cases}$

$\begin{cases} P_{STD} = 29.92 \\ P_1 = 29.76 \end{cases}$

$\Delta P = 0.2$

$1\,m^3/min = 35.3\,ft^3/min = 35.1\,cfm$

$$Q_{std} = \frac{V_{std}}{Time}$$

$$Q_{STD\,1} = \frac{35.3}{6.994} * \frac{29.76 - 0.2}{29.92} * 1.025 = 5.11\,cfm$$

$$Q_{st\,2} = \frac{35.3}{4.178} * \frac{29.76 - 0.4}{29.92} * 1.025 = 8.498\,cfm$$

$$Q_{st\,3^{st}} = \frac{35.3}{3.356} * \frac{29.76 - 0.6}{29.92} * 1.025 = 10.50\,cfm$$

$$Q_{st\,4} = \frac{35.3}{2.865} * \frac{29.76 - 0.8}{29.92} * 1.025 = 12.22\,cfm$$

$$Q_{st\,5} = \frac{35.3}{2.538} * \frac{29.76 - 1}{29.92} * 1.025 = 13.70\,cfm$$

Page

$$\sqrt{\Delta H \left(\frac{P_1}{P_{STD}}\right)\left(\frac{T_{STD}}{T_1}\right)} = \sqrt{\Delta H} * \sqrt{\frac{29.76}{29.92} * \frac{537}{524}} = \sqrt{\Delta H} * 1.0096$$

$\Delta H_1 = \sqrt{2} * 1.0096 = 1.428$

$\Delta H_2 = \sqrt{5.5} * 1.0096 = 2.367$

$\Delta H_3 = \sqrt{8.5} * 1.0096 = 2.943$

$\Delta H_4 = \sqrt{11.5} * 1.0096 = 3.424$

$\Delta H_5 = \sqrt{14.5} * 1.0096 = 3.844$

Table of calibration of manometer ($\sqrt{\text{corrected } \Delta H}$) versus Θ_{std}

$y = \sqrt{\Delta H * \frac{P_1}{P_{STD}} * \frac{T_{STD}}{T_1}}$	$x = \Theta_{STD}$ (cfm)
1.428	5.11
2.367	8.498
2.943	10.50
3.424	12.22
3.844	13.70

Linear Regression method $\quad y = mx + b$

$m = .28$

$b = -.0156$

$cc = 0.999$

$y = 0.28x - .0156$

$$x = \frac{y + .0156}{0.28}$$

$$\Theta_{std} = \frac{1}{0.28}\left[\sqrt{\Delta H * \frac{P_1}{P_{std}} * \frac{T_{std}}{T_1}} + .0156\right]$$

Date of : 7-22-87

EE-1 site Q/R [Table of calibration of flow rate (Q) versus M_{std}] calculated by m.

magnehelic Gage Reading (m)	$= M_{std}$ (X) [1]	manometer (ΔH) Reading (in. H_2O)	$\sqrt{\text{corrected } \Delta H}$ (1) $= \sqrt{\Delta H \cdot \frac{P_2}{P_{std}} \cdot \frac{T_{std}}{T}}$	Q (cfm) (Y) [2]
68	8.246	3.5/3.4	1.846	6.648
60	7.70	3.2/3.1	1.764	6.356
50	7.03	2.7/2.6	1.618	5.834
40	6.286	2.2/2.1	1.457	5.259
30	5.44	1.6/1.6	1.28	4.63

(1)
$T = 460 + 89 = 549$, $T_{std} = 537$

$P = 30.21$ in

$P_{std} = 29.92$

$$\sqrt{\frac{P}{P_{std}} \cdot \frac{T_{std}}{T}} = \sqrt{\frac{30.21}{29.92} \cdot \frac{537}{549}} = .994$$

$$\sqrt{\text{corrected } \Delta H} = \sqrt{\Delta H} \cdot .994 \;/\; M_{std} = \sqrt{m} \cdot 0.994$$

(2)
$$Q = \frac{1}{0.28}\left[\sqrt{\Delta H \cdot \frac{P}{P_{std}} \cdot \frac{T_{std}}{T}} + .0156\right]$$

$$\overset{Q}{Y} = m\overset{M_{std}}{X} + b$$

$Y = 0.733X + 0.658$

$cc = 0.998$

Date of Calibration: 7-22-87 page

EE-2 site O/R [Table of calibration of flow rate (Q) versus M_{std}] Calculated!

magnehelic (M)	M_{std} (1) (X)	manometer Reading in H_2O (ΔH)	$\sqrt{\text{Corrected } \Delta H}$ (1)	Q (cfm) (2) (Y)
58	7.57	3.2	1.778	6.406
50	7.03	2.8	1.663	5.995
40	6.29	2.4/2.3	1.524	5.498
30	5.44	1.8/1.8	1.333	4.816

(1)

$T_2 = 549$, $T_{std} = 537$

$P_2 = 30.21$ $P_{std} = 29.92$

$$\sqrt{\text{Correct } \Delta H} = \sqrt{\Delta H \times \frac{P}{P_{std}} \times \frac{T_{std}}{T}} = \sqrt{\Delta H} \times 0.994$$

$$M_{std} = \sqrt{M} \times .994$$

(2)

$$Q = \frac{1}{0.28}\left[\sqrt{\text{Corrected } \Delta H} + .0156\right]$$

$$Y = 0.74 X + 0.809$$

$$cc = 0.999$$

Date of Calibration 7-22-87 [Table of Calibration of Flow rate (Q) versus M_{std}]

EE-3 site G/R

magnehelic Gage Reading (M)	M_{std} (1) (X)	manometer (ΔH) Reading (in. H_2O)	$\sqrt{\text{corrected } \Delta H}$ (1) $= \sqrt{\Delta H \cdot \frac{P_2}{P_{std}} \cdot \frac{T_{std}}{T}}$	Q (2) (cfm) (Y)
63	7.89	3.3/3.3	1.806	6.506
60	7.70	3.2/3.2	1.778	6.406
50	7.03	2.8/2.7	1.648	5.941
40	6.29	2.2/2.2	1.474	5.32
30	5.44	1.7/1.7	1.296	4.684

(1) $T = 460 + 89 = 549$, $T_{std} = 537$

$P = 30.21$ in

$P_{std} = 29.92$

$$\sqrt{\frac{P}{P_{std}} \cdot \frac{T_{std}}{T}} = \sqrt{\frac{30.21}{29.92} \cdot \frac{537}{549}} = .994$$

$\sqrt{\text{corrected } \Delta H} = \sqrt{\Delta H} \cdot .994$ // $M_{std} = \sqrt{M} \cdot .994$

(2) $$Q = \frac{1}{0.28}\left[\sqrt{\Delta H \cdot \frac{P}{P_{std}} \cdot \frac{T_{std}}{T}} + .0156\right]$$

Q, magnehelic Reading

$Y = mX + b$

$Y = 0.754X + 0.589$

$cr = .999$

Date of Calibrat 7-22-87 [Table of calibration of flow rate (Θ) versus M_{std}] [illegible] Calibrat

EE-4 at Θ/R

magnehelic Gage Reading (M)	= M_{std} (1) (X)	manometer (ΔH) Reading (in. H_2O)	$\sqrt{\text{corrected } \Delta H}$ (1) $= \sqrt{\Delta H \cdot \frac{P}{P_{std}} \cdot \frac{T}{T}}$	Θ (2) (cfm) (Y)
58	7.57	3.3/3.1	1.778	6.406
50	7.03	2.9/2.7	1.663	5.995
40	6.29	2.4/2.3	1.524	5.498
30	5.44	1.9/1.8	1.352	4.884

(1) $T = 460 + 89 = 549$, $T_{std} = 537$

$P = 30.21$ in

$P_{std} = 29.92$

$$\sqrt{\frac{P}{P_{std}} \cdot \frac{T_{std}}{T}} = \sqrt{\frac{30.21}{29.92} \cdot \frac{537.}{549}} = .994$$

$$\sqrt{\text{corrected } \Delta H} = \sqrt{\Delta H} \cdot .994 \quad // \quad M_{std} = \sqrt{M} \cdot .994$$

(2) $$Θ = \frac{1}{0.28}\left[\sqrt{\Delta H \cdot \frac{P}{P_{std}} \cdot \frac{T_{std}}{T}} + .0156\right]$$

Q — magnehelic Reading

$Y = mX + b$

$Y = 0.711\,X + 1.013$

cc = 0.999

Date of Calib.: 7-22-87 [versus M_{std}] page Calculator

EE-5 at Q/R

magnehelic Gage Reading	$M_{std}^{(1)}$ (X)	manometer (ΔH) Reading (in. H_2O)	$\sqrt{\text{corrected } \Delta H}$ (1) $= \sqrt{\Delta H \cdot \frac{P_2}{P_{std}} \cdot \frac{T}{T}}$	$Q^{(2)}$ (cfm) (Y)
68	8.196	3.6/3.5	1.873	6.745
60	7.70	3.3/3.2	1.778	6.406
50	7.03	2.8/2.7	1.648	5.941
40	6.286	2.4/2.3	1.524	5.498
30	5.44	1.8/1.8	1.333	4.816

(1)
$T = 460 + 89 = 549, \quad T_{std} = 537$

$P = 30.21$ in

$P_{std} = 29.92$

$\sqrt{\frac{P}{P_{std}} \cdot \frac{T_{std}}{T}} = \sqrt{\frac{30.21}{29.92} \cdot \frac{537.}{549}} = .994$

$\sqrt{\text{corrected } \Delta H} = \sqrt{\Delta H} \cdot .994$ // $M_{std} = \sqrt{M} \cdot 0.994$

(2) $Q = \frac{1}{0.28}\left[\sqrt{\Delta H \cdot \frac{P}{P_{std}} \cdot \frac{T_{std}}{T}} + .0156\right]$

Q, magnehelic Reading

$Y = mX + b$

$Y = 0.689\,X + 1.10$

$cr = 0.999$

Calculated by MG
10-20-87

EE-1 7/16/87
Site G

Time (min)	Elapse Time (min)	Corrected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air volume (3)
7:02			42	6.56			
	448	443			6.50	5.42	2401
14:30			41	6.43			
	135	134			6.47	5.40	723
16:45			42	6.51			
	158	156			6.48	5.41	844
[illegible]:23			42	6.46			

Total Air vol. 3968 c.ft.

(1) $M_{std} = \overline{M} \times$ Correction factor

Correction factor = [illegible] $\frac{T_{std}}{T}$

$Cf_1 = \sqrt{\frac{30.05 \times 537}{29.92 \times 537}} = 1.012$

$Cf_2 = \sqrt{\frac{30.03 \times 537}{29.92 \times 542}} = .997$

$Cf_{Avg} = 1.004$

(2) $\overset{Q}{Y} = 0.733X + 0.658$

3) Air volume = Q × Elapse Time

3E-2 7/16/87
site G

Time (min)	Elapse Time (min)	Corrected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air Volume (3)
7:14			34	5.90			
	436	408			5.79	5.09	2077
14:30			32	5.68			
	135	126			5.72	5.04	635
16:45			33	5.77			
	186	174			5.79	5.09	886
19:51			34	5.81			

Total Air vol. 3598 cu.ft.

(1) $M_{std} = \sqrt{M} \times$ Correction factor

Correction factor = $\sqrt{\frac{P}{P_{std}} \times \frac{T_{std}}{T}}$

$cf_1 = 1.012$ $cf_{Avg} = 1.004$

$cf_2 = .997$

(2) $Y = 0.74\,X + 0.809$ Q

(3) Air volume = Q × Elapse Time

E-3 7/16/87
Site C

Time (min)	Elapse Time (min)	Corrected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air Volume (3)
7:10			38	6.24			
	440	410 6			6.09	5.17	2123
14:30			35	5.94			
	135	126			5.98	5.10	642
16:45			36	6.02			
	195	182			6.00	5.11	930
20:00			36	5.98			
						Total Q_{Air}	3695

(1)
$M_{std} = \sqrt{M} *$ Correction factor
Correction factor $= \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$CF_1 = 1.012$
$CF_2 = .997$
$CF_{Avg} = 1.004$

(2) $Y = 0.754X + 0.589$ (Y = Q)

3) Air volume = Q * Elapse Time

FE-4 7/16/87
Site C

Time (min)	Elapse Time (min)	Corrected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air Volume (3)
7:18			40	6.40			
	432	432			6.25	5.46	2359
14:30			37	6.41			
	135	135			6.11	5.36	724
16:45			37	6.11			
	174	174			6.13	5.37	934
19:39			38	6.15			

Total air vol. 4017 cu. ft.

(1)
$M_{std} = \sqrt{M} \times$ Correction factor

Correction factor $= \sqrt{\frac{P}{P_{std}} \times \frac{T_{std}}{T}}$

$CF_1 = 1.012$
$CF_2 = .997$
$CF_{Avg} = 1.004$

(2) $\overset{Q}{Y} = 0.711 X + 1.013$

3) Air volume = Q × Elapse Time

EE-5 7/16/87
site G

Time (min)	Elapse Time (min)	Corrected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air volume (3)
7:22			40	6.40			
	428	373			6.26	5.41	2018
14:30			37	6.11			
	135	117			6.06	5.27	617
16:45			36	6.02			
	205	178			6.12	5.32	947
20:10			39	6.23			

Total Air vol. 3582 cft

(1)
$M_{std} = \sqrt{M} \times$ Correction factor

Correction factor $= \sqrt{\frac{P}{P_{std}} \times \frac{T_{std}}{T}}$

$CF_1 = 1.012$
$CF_2 = .997$
$CF_{avg} = 1.004$

(2) $Y = 0.689X + 1.10$ (Y = Q)

3) Air volume = Q × Elapse Time

EE-6 7/16/87
site 6

Time (min)	Elapse Time (min)	Corrected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air volume (3)
704			36	6.07			
	446	392			5.96	5.19	2034
14:30			34	5.85			
	135	119			5.81	5.08	604
16:45			33	5.77			
	160	141			5.79	5.06	713
19:25			34	5.81			
						Total Air vol.	3351

(1)
$M_{std} = \sqrt{M} \times$ Correction factor

Correction factor $= \sqrt{\frac{P}{P_{std}} \cdot \frac{T_{std}}{T}}$

$Cf_1 = 1.012$
$Cf_2 = .997$
$Cf_{Avg} = 1.004$

2) $\overset{Q}{Y} = 0.761X + 0.659$

3) Air volume = Q * Elapse Time

Calculated by MG
10-20-87

E-1 7-17-87
Site G

Time (min)	Elapse Time (min)	Corrected Time (min)	Magnehelic Reading (M)	(1) M_{std}	Avg. M_{std} (X)	(2) Avg. Q	(3) Air volume
6:00			5.3	7.36			
	300	246			6.56	5.47	1346
11:00			3.3	5.76			
	210	172			5.71	4.84	832
14:30			3.2	5.67			
	247	203			5.7	4.84	982
18:37			3.3	5.73			

Total Air vol. 3160

(1) $M_{std} = \sqrt{M} \times$ Correction factor

Correction factor $= \sqrt{\frac{P}{P_{std}} \times \frac{T_{std}}{T}}$

$CF_1 = \sqrt{\frac{30.14 + 537}{29.92 + 529}} = 1.011$ $CF_{Avg} = 1.003$

$CF_2 = \sqrt{\frac{30.10 + 537}{29.92 + 545}} = .997$

(2) $\overset{Q}{Y} = 0.733X + 0.658$

3) Air volume = Q × Elapse Time

FE-2
Site G

7-17-87

Time (min)	Elapse Time (min)	Corrected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air Volume (3)
6:10			44	6.71			
	290	289			6.40	5.45	1575
11:00			37	6.10			
	210	209			5.97	5.23	1093
14:30			34	5.85			
	221	220			5.83	5.12	1126
18:11			34	5.81			

Total Air vol. 3794

(1)
$M_{std} = \sqrt{M} \times$ Correction factor

Correction factor $= \sqrt{\frac{P}{P_{std}} \times \frac{T_{std}}{T}}$

$CF_1 = 1.011$
$CF_2 = .997$
$CF_{avg} = 1.003$

(2) $Y = 0.74\,X + 0.809$

3) Air volume = Q × Elapse Time

EE-3 7-17-87
site G

Time (min)	Elapse Time (min)	Corrected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air volume (3)
6:08			38	6.23			
	292	290			5.86	5.01	1453
11:00			30	5.49			
	210	209			5.40	4.66	974
14:30			28	5.31			
	242	241			5.29	4.58	1104
1:32			28	5.27			

Total Air vol. 3531

(1)
$M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$CF_1 = 1.011$
$CF_2 = .997$
$CF_{Avg} = 1.003$

(2) $Y = 0.754X + 0.589$

3) Air volume = Q * Elapse Time

EE-4 7-17-87
t G

Time (min)	Elapsed Time (min)	Corrected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air volume (3)
5:57			47	6.88			
	303	299			6.49	5.63	1683
11:00			37	6.10			
	210	207			6.06	5.32	1101
14:30			36	6.02			
	237	234			6.00	5.28	1235
18:27			36	5.98			

Total Air vol. 4019

(1)
$M_{std} = \sqrt{M} \times$ Correction factor
Correction factor $= \sqrt{\frac{P}{P_{std}} \times \frac{T_{std}}{T}}$

$Cf_1 = 1.003$
$Cf_2 = .997$
$Cf_{Avg} = 1.003$

(2) $Y = 0.711X + 1.013$

3) Air volume = Q * Elapsed Time

FE-5

7-17-87

Time (min)	Elapse Time (min)	Corrected Time (min)	Magnehelic Reading (M)	(1) M_{std}	Avg. M_{std} (X)	(2) Avg. Q	(3) Air Volume
5:53			44	6.71			
-	307	301			5.36	4.79	1442
11:00			36	6.02			
-	210	206			5.93	5.18	1067
4:30			34	5.85			
	230	226			5.87	5.14	1162
1 20			35	5.90			

Total Air vol. 3671

(1)
$M_{std} = \sqrt{M} \times$ Correction factor

Correction factor $= \sqrt{\frac{P}{P_{std}} \cdot \frac{T_{std}}{T}}$

$cf_1 = 1.011$
$cf_2 = .997$
$cf_{Avg} = 1.003$

(2) $Y = 0.689X + 1.10$

(3) Air volume = $Q \times$ Elapse Time

EE-6

site 6 7-17-87

Time (min)	Elapse Time (min)	Collected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air volume (3)
6:02			40	6.40			
	298	219			6.21	5.38	1178
11:00			36	6.02			
	210	155			5.93	5.17	801
14:30			34	5.85			
	248	183			5.74	5.03	920
18:38			32	5.64			

Total Air vol. 2899

(1)
$M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} \cdot \frac{T_{std}}{T}}$

$Cf_1 = 1.011$
$Cf_2 = .997$
$Cf_{Avg} = 1.003$

(2) $Y = 0.761\ X + 0.659$

(3) Air volume = Q * Elapse Time

Calculation by MC
10-20-87

FE-1

Site G/R 7-21-87

Time (min)	Elapse Time (min)	Corrected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q Y (cfm) (2)	Air Volume cft (3)
7:02			56	7.55			
	198	196			7.17	5.91	1158
10:20			46	6.79			
	250	247			6.79	5.63	1390
14:30			46	6.79			
	274	271			6.69	5.56	1507
1[illegible]4			44	6.60			
							4055

Total Air volume = 4055 Cft

(1) $M_{std} = \sqrt{M} \times$ Correction factor (Cf)

Correction factor $= \sqrt{\frac{P}{P_{std}} \times \frac{T_{std}}{T}}$

$Cf_{1\,start} = \sqrt{\frac{30.23}{29.92} \times \frac{537}{533}} = 1.009$

$Cf_{2\,stop} = \sqrt{\frac{30.17}{29.92} \times \frac{537}{547}} = 0.995$

$Cf_{avg} = \frac{Cf_1 + Cf_2}{2} = 1.002$

2) $\overset{Q}{Y} = 0.733X + 0.658$

3) Air volume = Q × Corrected Time

EE - 2

site Q/R 7-21-87

Time (min)	Elapse Time (min)	Corrected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air volume (3)
6:33			46	6.84			
	227	168			6.58	5.678	954
10:20			40	6.33			
	250	184			6.16	5.367	987
14:30			36	6.01			
	290	214			5.90	5.17	1107
19:20			34	5.80			

Total Air 3048 cu. ft. 3048

(1) $M_{std} = \sqrt{M} \times$ Correction factor $Cf_1 = 1.009$ $Cf_{Avg} = 1.002$

Correction factor $= \sqrt{\frac{P}{P_{std}} \times \frac{T_{std}}{T}}$ $Cf_2 = 0.995$

$P_{start} = 30.23$

2) $\underset{Q}{Y} = 0.74X + 0.809$

3) Air volume = Q × Corrected Time

FE-03
site Q/R 7-21-87

Time (min)	Elapse Time (min)	Corrected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air volume (3)
6:27			42	6.54			
	233	231			6.23	5.286	1221
10:20			35	5.93			
	250	248			5.84	4.99	1237
14:30			33	5.75			
	244	242			5.86	5.	1210
[illegible]4			36	5.97			

Total Air Volume = 3668 cu. ft. 3668

(1)
$M_{std} = \sqrt{M} \times$ Correction factor $Cf_1 = 1.009$ $Cf_{Avg} = 1.002$
$Cf_2 = 0.995$
Correction factor = $\sqrt{\frac{P}{P_{std}} \times \frac{T_{std}}{T}}$

2) $\overset{Q}{Y} = 0.754X + 0.589$

3) Air volume = Q × Corrected Time

=E-04

site Θ/R 7-21-87

Time (min)	Elapsed Time (min)	Collected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air Volume (3)
6:32			46	6.84			
	228	168			6.42	5.577	937
10:20			36	6.01			
	250	185			5.84	5.165	955
14:30			32	5.67			
	288	212			5.65	5.03	1067
19:18			32	5.62			

Total Air 2959 c.ft.

(1)
$M_{std} = \sqrt{M} \times$ Correction factor $cf_1 = 1.009$ $cf_{Avg} = 1.002$

Correction factor $= \sqrt{\frac{P}{P_{std}} \times \frac{T_{std}}{T}}$ $cf_2 = 0.995$

2) $Y = 0.711X + 1.013$

) Air volume = Q × Collection Time

Data is not accurate

FE-5
te Q/R 7-21-87

Time (min)	Elapse Time (min)	Collected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air Volume (3)
6:40			46	6.84			
	220				6.59	5.64	
10:20			40	6.34			
	250				6.34	5.468	
14:30			40	6.34			
	259				6.35	5.475	
8 9			41	6.37			

1) $M_{std} = \sqrt{M} \times \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} \times \frac{T_{std}}{T}}$

Q

2) $Y = 0.689X + 1.10$

3) Air volume = Q × [illegible] Time

= -06

S-i Q/R 7-21-87

Time (min)	Elapse Time (min)	Corrected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air volume (3)
6:54			44	6.69			
	274	264			6.51	5.61	1481
10:20			40	6.34			
	250	241			6.09	5.29	1275
14:30			34	5.89			
	281	271			5.82	5.09	1379
19:11			34	5.80			

Total Air volume 4135

(1)
$M_{std} = \sqrt{M} \times$ Correction factor

Correction factor $= \sqrt{\frac{P}{P_{std}} \cdot \frac{T_{std}}{T}}$

(2) $\overset{Q}{Y} = 0.761\,X + 0.659$

(3) Air volume = Q × Time

=E-1
Site O/R 7/22/87 motor Break Down

Time (min)	Elapse Time (min)	Corrected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air volume (3)

(1)
$M_{std} = \sqrt{M} \cdot$ Correction factor

Correction factor $= \sqrt{\frac{P}{P_{std}} \cdot \frac{T_{std}}{T}}$

2) Q

) Air volume $= \dot{Q} \cdot$ Time

calculated by MG

10-20-87

EE-2 7-22-87

site Θ/R

Time (min)	Elapse Time (min)	Collected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air Volume (3)
6:08			38	6.21			
	352	279			6.07	5.31	1481
12.00			35	5.93			
	180	142			5.84	5.13	728
15.00			33	5.76			
	254	201			5.87	5.15	1037
19:14			36	5.98			
					Total		3246 cu ft.

(1) $M_{std} = \sqrt{M} \times$ Correction factor (cf)

Correction factor $= \sqrt{\frac{P}{P_{std}} \times \frac{T_{std}}{T}}$

$cf_1 = \sqrt{\frac{30.21 \times 537}{29.92 \times 534}} = 1.007$ (start)

$cf_2 = \sqrt{\frac{30.1 \times 537}{29.92 \times 546}} = 0.977$ (stop)

$cf_{Avg} = 1.002$

(2) $Y = 0.74X + .809$

3) Air volume = $\dot{Q}$ * Elapse Time

FE - 3 7-22-87
site Q/R

Time (min)	Elapse Time (min)	Corrected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air Volume (3)
6:35			54	7.40			
	325	325			6.94	5.82	1891
12.00			42	6.49			
	180	180			6.41	5.42	976
15.00			40	6.34			
	237	237			6.32	5.35	1268
18:57			40	6.30			
					Total Air		4135 cu ft.

(1)
$M_{std} = \sqrt{M} \times$ Correction factor $cf_1 = 1.007$ $cf_{Avg} = 1.002$

Correction factor $= \sqrt{\frac{P}{P_{std}} \times \frac{T_{std}}{T}}$ $cf_2 = 0.997$

(2) $Y = 0.754\,X + 0.589$

3) Air volume = Q × Elapse Time

TE-04 7-22-87

Site G/R

Time (min)	Elapsed Time (min)	Corrected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air Volume (3)
6:07			32	5.70			
	353	279			5.30	4.78	1334
12.00			24	4.91			
	180	142			4.91	4.50	639
15.00			24	4.91			
	253	200			5.09	4.63	926
19:13			28	5.27			

Total Air 2899 cu.ft.

(1) $M_{std} = \sqrt{M} * \text{Correction factor}$

Correction factor $= \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$Cf_1 = 1.007$

$Cf_2 = 0.997$

$Cf_{Avg} = 1.002$

(2) $Y = 0.711\,X + 1.013$

3) Air volume = Q * Elapsed Time

EE-05 7-22-87
site Q/R

Time (min)	Elapse Time (min)	Collected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air volume (3)
6:14			47	6.90			
	346	341			6.54	5.61	1913
12:00			38	6.18			
	180	177			6.13	5.32	942
15:00			37	6.09			
	206	203			6.07	5.28	1072
18:26			37	6.06			

Total Air volume 3927 cu.ft.

(1) $M_{std} = \sqrt{M} \times$ Correction factor

Correction factor $= \sqrt{\frac{P}{P_{std}} \times \frac{T_{std}}{T}}$

(2) $Y = 0.689X + 1.10$

3) Air volume $= Q \times$ Elapse Time

EE-6 7-22-87
site Q/R

Time (min)	Elapse Time (min)	Collected Time (min)	Magnehelic Reading (M)	M_{std} (1)	Avg. M_{std} (X)	Avg. Q (2)	Air Volume (3)
6:21			46	6.83			
	339	337			6.38	5.51	1857
12:00			35	5.93			
	180	179			5.88	5.13	918
15:00			34	5.84			
	221	219			5.87	5.13	1123
18:41			35	5.90			

Total Air volume 3898 cu.ft.

(1)
$M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

(2) $Y = 0.761 X + 0.659$

3) $\text{Air volume} = Q * \text{Elapse Time}$

AIR SAMPLING

PT - PUF TUBE
PC - PUF CARTRIDGE
CT - CHARCOAL TUBE
FF - FILTER

SAMPLE NO.	DATE	START TIME	END TIME	SAMPLE LOCATION	SAMPLE TYPE	START FLOW	FINAL FLOW	SAMPLER CODE	COMMENTS
AC-CT-02	7/16/87	0445	1645	E. of AC fence, 150' S of quarry AC	CT	489 ml	440.8 ml	EE-2 (pump B (1103) manual)	
AC-PT-02	7/16/87	0445	1645	" " " "	PT	1069 ml	1049 ml	EE-2	
AC-CT-03		0851	1655	NE of site 6, adj. cargo fence (70' N of quarry, 40' E of AC)	CT	519.3 ml	506.4 ml	EE-3 (L-pump (1327) man. A)	
AC-PT-03		0851	1655	" " " "	PT	995.3 ml	1186 ml	EE-3	
AC-CT-01		0905	1710	Site 6 - NE corner	CT	490.0 ml (500.5)	515.5 ml	EE-1 (pump C (1936) manual)	
AC-PT-01		0905	1710	" "	PT	977.9 ml	981.1 ml	EE-1	
AC-CT-06*		0920	1718	Site 6 - NE corner	CT	481.7 ml	811.8 ml	EE-6 (pump (1930) man A)	Co-located sample AC-CT-01
AC-PT-06*		0920	1718	" "	PT	1060 ml	1010 ml	EE-6	Co-located sample AC-PT-01
AC-CT-05		0935	1732	SW of site 6 adj to wall AE 6101	CT	491.0 ml	446.7 ml	EE-5 (pump F (1003) man A)	Background sample
AC-PT-05		0935	1732	" " " "	PT	997.3 ml	1043 ml	EE-5	Background sample.
AC-CT-07*		1000	—	Blank	CT	—	—	—	
AC-PT-07*		1000	—	Blank	PT	—	—	—	
AC-PC-01		0702	1923	Site 6 - NE corner	PC	42	42	AA-1	
AC-FF-01		0702	1923	" " "	FF	"	"	AA-1	
AC-PC-02		0714	1951	E. of AC fence, 150' S of quarry	PC	34	34	AA-2	
AC-FF-02		0714	1951	" " " "	FF	"	"	AA-2	
AC-PC-03		0710	2000	NE of site 6, adj. cargo fence	PC	38	36	AA-3	
AC-FF-03		0710	2000	" " " "	FF	"	"	AA-3	
AC-PC-04		0718	1939	Site 6 - NW corner	PC	40	38	AA-4	
AC-FF-04		0718	1939	" " "	FF	"	"	AA-4	
AC-PC-05		0732	2010	SW of site 6 adj. to wall AE 6101	PC	40	39	AA-5	Background sample
AC-FF-05		0732	2010	" " " "	FF	"	"	AA-5	Background sample
AC-PC-06*		0704	1935	Site 6 - NE corner	PC	36	34	AA-6	Co-located sample AC-PC-01
AC-FF-06*		0704	1935	" " "	FF	"	"	AA-6	Co-located sample AC-FF-01
AC-PC-07*		1000	—	Blank	PC	-	-	—	
AC-FF-07*	✓	1000	—	Blank	FF	-	-	—	

Sample No.	Date	Start Time	End Time	Sample Location	Media	Flow Start	Flow End	Sampler Code	Comments
AC-CT-08	7/17/87	0820	1631	E of AC fence, [illegible] S of Quarry Av.	CT	506.1 ml	518.1 ml	Pump 13450, Man C	
AC-PT-08		0820			PT	1017 ml	966.9 ml	"	
AC-PC-08		0610			PC	44		AA-2	
AC-FF-08		0610			FF	44		AA-2	
AC-CT-09		0820	1636	NE of Site 6, adj. clear fence	CT	545.8 ml	573.2 ml	Pump 13409, Man A	
AC-PT-09		0820	1636		PT	1068 ml	367.2 ml	"	
AC-PC-09		0608			PC	38		AA-3	
AC-FF-09		0608			FF	38		AA-3	
AC-CT-10		0842	1643	Site 6 - NE corner	CT	545.1 ml	456.0 ml	Pump 13406, Man B	
AC-PT-10		0842	1643		PT	889.5 ml	355.2 ml	"	
AC-PC-10		0600			PC	53		AA-1	
AC-FF-10		0600			FF	53		AA-1	
AC-CT-11 *		0847	1645	Site 6 - NE corner	CT	783 ml	305.4 ml	Pump 13408, Man B	Co-located (AA-1)
AC-PT-11 *		0847	1645		PT	1055 ml	1145 ml	"	
AC-PC-11 *		0602			PC	40		AA-6	
AC-FF-11 *		0602			FF	40		AA-6	
AC-CT-12		0700	1656	SW of Site 6, adj. to well EA-6101	CT	547.5 ml	463.7	Pump 13407, Man A	
AC-PT-12		0700	1656		PT	1041 ml	936.7	"	
AC-PC-12		0553			PC	44		AA-5	
AC-FF-12		0553			FF	44		AA-5	
AC-PC-13		0557		Site 6 - NW corner	PC	47		AA-4	
AC-FF-13		0557			FF	47		AA-4	
AC-CT-14 *				Blank	CT	—	—	—	
AC-PT-14 *				Blank	PT	—	—	—	
AC-PC-14 *				Blank	PC	—	—	—	
AC-FF-14 *				Blank	FF	—	—	—	

AIR SAMPLING

SAMPLE NO.	DATE	START TIME	END TIME	SAMPLE LOCATION	MEDIUM	FLOW START	FLOW END	SAMPLER CODE	COMMENTS
AC-CF-15	7/21/87	0821	1647	NW PORTION - ABT MONSANTO FENCE	CF	534.9 ml	554.0 ml	PUMP 1312, MANC	
AC-PF-15	↓	0821	1645	" " "	PF	994.2 ml	978.6 ml	"	
AC-PC-15		0633	1920	NW PORTION - ABT MONSANTO FENCE	PC	46	34	AA-2	SAMPLER TIMER SHUT-POSSIBLY DUE TO GENERATOR FAILURE
AC-FF-15		0633	1920	" " "	FF	46	34	AA-2	
AC-CF-16		0800	1635	NE CORNER - ABT PUMP STATION	CF	500.0 ml	616.6 ml	PUMP 13021, MANO	
AC-PF-16		0800	1635	" " "	PF	515.0 ml	237.0 ml	"	
AC-PC-16		0627	1834	NE CORNER - ABT PUMP STATION	PC	42	36	EA-3	
AC-FF-16		0627	1834	" " "	FF	42	36	EA-3	
AC-CF-17*		~~0800~~ 0820	1645	NW PORTION - ABT MONSANTO FENCE	CF	~~520 ml~~ 1655 ml	635.5 ml	PUMP 13026, MANC	CO-LOCATED SAMPLE (AC-15)
AC-PF-17*		~~0800~~ 0820	1645	" " "	PF	~~515.0 ml~~ 500.4 ml	185.4 ml	"	" " "
AC-PC-17*		0632	1918	NW PORTION - ABT MONSANTO FENCE	PC	46	32	EE-4	CO-LOCATED SAMPLE (AC-15)
AC-FF-17*		0632	1918	" " "	FF	46	32	AA-4	SAMPLER TIMER SHUT (ROUND)
AC-CF-18		0833	1658	SW PORTION - BACKGROUND	CF	513.0 ml	~~1007 ml~~ 471.4 ml	PUMP 13020, MANO	
AC-PF-18		0833	1658	" "	PF	992.8 ml	1007 ml	"	
AC-PC-18		0654	1911	SW PORTION - BACKGROUND	PC	44	34	AA-6	
AC-FF-18		0654	1911	" " "	FF	44	34	AA-6	
AC-CF-19		0826	1652	SW - NORTHERN PORTION SITE Q	CF	501.8 ml	503.3 ml	PUMP 13127, MANO	
AC-PF-19		0826	1652	" " "	PF	973.9 ml	863.9 ml	"	
AC-PC-19		0640	1849	SW - NORTHERN PORTION OF SITE Q	PC	46	41	AA-5	
AC-FF-19		0640	1849	" " "	FF	46	41	AA-5	
AC-PC-20		0702	1904	SE PORTION SITE Q	PC	56	44	EE-1	
AC-FF-20		0702	1904	" " "	FF	56	44	EE-1	
AC-CF-21*		0700	—	BLANK	CF	—	—	—	
AC-PF-21*		0700	—	BLANK	PF	—	—	—	
AC-PC-21*		0700	—	BLANK	PC	—	—	—	
AC-FF-21*	↓	0700	—	BLANK	FF	—	—	—	

SAMPLE NO.	DATE	START TIME	END TIME	SAMPLE LOCATION	MEDIUM	FLOW START	FLOW END	SAMPLE CODE	NOTES
AC-CT-22	7/02/87	0825	1645	NW PORTION - ADJ MONSANTO FENCE	CT	1540.8 ml	529.6 ml	PUMP 13430, PUMP C	
AC-PT-22		0825	1645	" " "	PT	970.2 ml	975.3 ml	"	
AC-PC-22		0608	1914	NW PORTION - ADJ. MONSANTO FENCE	PC	38	36	EE-2	
AC-FF-22		0608	1914	" " "	FF	38	36	EE-2	
AC-CT-23		0900	1702	NE CORNER - ADJ. PUMP STATION	CT	461.8 ml	611.2 ml	PUMP 13431, PUMP D	
AC-PT-23		0900	1702	" " "	PT	200 ml	716.8 ml	"	
AC-PC-23		0635	1857	NE CORNER - ADJ PUMP STATION	PC	54	40	EE-3	
AC-FF-23		0635	1857	" " "	FF	54	40	EE-3	
AC-CT-24		0840	1642	NW PORTION - ADJ MONSANTO FENCE	CT	446.2 ml	533 ml	PUMP 13426, PUMP E	* PROBLEM W/ PUMP FAULTING
AC-PT-24		0840	1642	" " "	PT	330.0 ml	403 ml	"	
AC-PC-24		0607	1913	NW PORTION - ADJ. MONSANTO FENCE	PC	32 ~~446.0~~	28	EE-4	
AC-FF-24		0607	1913	" " "	FF	32	28	EE-4	
AC-CT-25		0850	1654	SW PORTION - BACKGROUND	CT	515 ml	521.0 ml	PUMP 13428, PUMP B	
AC-PT-25		0850	1654	" " "	PT	1001 ml	984.2 ml	"	
AC-PC-25		0621	1841	SW PORTION - BACKGROUND	PC	46	35	EE-6	
AC-FF-25		0621	1841	" " "	FF	46	35	EE-6	
AC-CT-26		0845	1648	SW - NORTHERN PORTION - SITE Q	CT	517.0 ml	516.9 ml	PUMP 13427, PUMP A	
AC-PT-26		0845	1648	" " "	PT	966.5 ml	840.1 ml	"	
AC-PC-26		0614	1826	SW - NORTHERN PORTION SITE Q	PC	47	37	EE-5	
AC-FF-26		0614	1826	" " "	FF	47	37	EE-5	
AC-PC-27		0627	* —	SE PORTION SITE Q	PC	58	* —	EE-1	* MOTOR FAILURE ON SAMPLER UNIT - TOTAL RUN TIME FROM SAMPLER TIMER: [illegible] NO. PC, FF SAMPLES SUBMITTED.
AC-FF-27		0627	—	" " "	FF	58	—	EE-1	
AC-CT-28 *		0800	—	BLANK	CT	—	—	—	
AC-PT-28 *		0800	—	BLANK	PT	—	—	—	
AC-PC-28 *		0800	—	BLANK	PC	—	—	—	
AC-FF-28 *	↓	0800	—	BLANK	FF	—	—	—	

Ground Water Pest/PCBs

SITE	SITE G	BLANK	SITE L	SITE G	SITE G	SITE G	BLANK	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	BLANK
SAMPLE NUMBER	DC-GW-16	DC-GW-17*	DC-GW-18	DC-GW-19	DC-GW-20 *	DC-GW-21	DC-GW-22 *	DC-GW-23	DC-GW-24	DC-GW-25	DC-GW-26	DC-GW-27	DC-GW-28	DC-GW-29 *	DC-GW-30 *
WELL NUMBER	EE-G104		EE-G108	EE-G107	EE-G107	EE-05		EE-13	EE-12	EE-G112	EE-14	EE-15	EE-16	EE-12	
DATE SAMPLED	3-17-87	3-17-87	3-18-87	3-18-87	3-18-87	3-18-87	3-18-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87
1 Alpha-BHC															
2 Beta-BHC															
3 Delta-BHC															
4 Gamma-BHC (Lindane)															
5 Heptachlor															
6 Aldrin															
7 Heptachlor Epoxide															
8 Edosulfan I															
9 Dieldrin															
10 4,4'-DDE															
11 Endrin															
12 Edosulfan II															
13 4,4'-DDD															
14 Endosulfan Sulfate															
15 4,4'-DDT															
16 Methoxychlor															
17 Endrin Ketone															
18 Chlordane															
19 Toxaphene															
20 AROCLOR-1016															
21 AROCLOR-1221															
22 AROCLOR-1232															
23 AROCLOR-1242															
24 AROCLOR-1248															
25 AROCLOR-1254															
26 AROCLOR-1260				890	650										

Ground Water Pest/PCBs

SITE	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	SITE H	SITE H	SITE H	SITE H	SITE G	SITE G
SAMPLE NUMBER	DC-GW-01	DC-GW-02	DC-GW-03	DC-GW-04	DC-GW-05	DC-GW-06	DC-GW-07	DC-GW-08 *	DC-GW-09	DC-GW-10	DC-GW-11	DC-GW-12	DC-GW-13	DC-GW-14	DC-GW-15
WELL NUMBER	EE-06	EE-07	EE-09	EE-10	EE-17	EE-08	EE-19	EE-19	EE-18	EE-01	EE-02	EE-03	EE-04	EE-G101	EE-G103
DATE SAMPLED	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-17-87	3-17-87	3-17-67	3-17-67	3-17-67	3-17-87
1 Alpha-BHC															
2 Beta-BHC															
3 Delta-BHC															
4 Gamma-BHC (Lindane)															
5 Heptachlor															
6 Aldrin															
7 Heptachlor Epoxide															
8 Edosulfan I															
9 Dieldrin															
10 4,4'-DDE															
11 Endrin															
12 Edosulfan II															
13 4,4'-DDD															
14 Endosulfan Sulfate															
15 4,4'-DDT															
16 Methoxychlor															
17 Endrin Ketone															
18 Chlordane															
19 Toxaphene															
20 AROCLOR-1016															
21 AROCLOR-1221															
22 AROCLOR-1232															
23 AROCLOR-1242															
24 AROCLOR-1248															
25 AROCLOR-1254															
26 AROCLOR-1260															

14 J

Ground Water Semivolatiles

SITE	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	SITE H	SITE H	SITE H	SITE H	SITE G
SAMPLE NUMBER	BC-GW-01	BC-GW-02	BC-GW-03	BC-GW-04	BC-GW-05	BC-GW-06	BC-GW-07	BC-GW-08	BC-GW-09	BC-GW-10	BC-GW-11	BC-GW-12	BC-GW-13	BC-GW-14
WELL NUMBER	EE-06	EE-07	EE-09	EE-10	EE-17	EE-08	EE-19	EE-19	EE-18	EE-01	EE-02	EE-03	EE-04	EE-0151
DATE SAMPLED	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-17-87	3-17-87	3-17-87	3-17-87	3-17-87
1 Phenol							110000 E	190000 E	6100 E	66	950			
2 bis(2-Chloroethyl)ether														
3 2-Chlorophenol				4 J			20000 E	33000 E	2600	31 J	47 J			
4 1,3-Dichlorobenzene										120				
5 1,4-Dichlorobenzene				4			220 J	250	70 J	2600	530	11		
6 Benzyl Alcohol							460	490	100		740			
7 1,2-Dichlorobenzene							260	300	2000	560	430	3		
8 2-Methylphenol							190 J	350	10 J	26 J	70 J			
9 bis(2-Chloroisopropyl) ether		3 J												
10 4-Methylphenol							14000 E	23000 E	850	65	620			
11 N-Nitroso-n-Dipropylamine														
12 Hexachloroethane														
13 Nitrobenzene								100 J	820		97 J			
14 Isophorone											110 J			
15 2-Nitrophenol														
16 2,4-Dimethylphenol		5 J						2000	62		330			
17 Benzoic Acid		10 J							600	140 J	5000 E			
18 bis-(2-Chloroethoxy)methane														
19 2,4-Dichlorophenol							1900 E	14000 E	7600 E		1900			
20 1,2,4-Trichlorobenzene									390	500	720			
21 Naphthalene							41 J	42 J	70	250	240			1 J
22 4-Chloroaniline	120						18000 E	15000 E	4400	6400 E	810	200		
23 Hexachlorobutadiene														
24 4-Chloro-3-methylphenol														
25 2-Methylnaphthalene										21 J	47 J			
26 Hexachlorocyclopentadiene														
27 2,4,6-Trichlorophenol							4100	6000	1800	140	1200			
28 2,4,5-Trichlorophenol										27 J	580 J			
29 2-Chloronaphthalene														
30 2-Nitroaniline							1700	1800	2000					

Ground Water Volatiles

SITE	BLANK
SAMPLE NUMBER	OC-GW-57 +
WELL NUMBER	
DATE SAMPLED	7-14-87

1 Chloromethane
2 Bromomethane
3 Vinyl Chloride
4 Chloroethane
5 Methylene Chloride
6 Acetone
7 Carbon Disulfide
8 1,1-Dichloroethene
9 1,1-Dichloroethane
10 trans-1,2-Dichloroethene
11 Chloroform
12 1-2-Dichloroethane
13 2-Butanone (MEK)
14 1,1,1-Trichloroethane
15 Carbon Tetrachloride
16 Vinyl Acetate
17 Bromodichloromethane
18 1,2-Dichloropropane
19 trans-1,3-Dichloropropene
20 Trichloroethene
21 Dibromochloromethane
22 1,1,2-Trichloroethane
23 Benzene
24 cis-1,3-Dichloropropene
25 2-Chloroethyl Vinyl Ether
26 Bromoform
27 4-Methyl-2-pentanone
28 2-Hexanone
29 Tetrachloroethene
30 1,1,2,2-Tetrachloroethane
31 Toluene
32 Chlorobenzene
33 Ethylbenzene
34 Styrene
35 Total Xylenes

Ground Water Volatiles

SITE	SITE U	SITE U	SITE U	SITE R	SITE R	SITE R	SITE R	SITE R	SITE R	SITE R	BLANK	PRIVATE	PRIVATE	PRIVATE	PRIVATE	PRIVATE
SAMPLE NUMBER	BC-GW-42 &	BC-GW-43	BC-GW-43A	BC-GW-44	BC-GW-45	BC-GW-46	BC-GW-47	BC-GW-48	BC-GW-49	BC-GW-50	BC-GW-51*	BC-GW-52	BC-GW-53	BC-GW-54	BC-GW-55	BC-GW-56
WELL NUMBER	EE-24	EE-25	EE-25	P-1	B-20A	P-7	B-26A	B-26A	B-25A	P-11		WRIGHT	SETTLES	SCHMIDT	McDONALD	CLAYTON
DATE SAMPLED	3-24-87	3-24-87	7-14-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-26-87	3-26-87	3-26-87	3-26-87	3-26-87
1 Chloromethane																
2 Bromomethane																
3 Vinyl Chloride																17
4 Chloroethane																10
5 Methylene Chloride	310										2 J	4 DJ	12 B		37 B	
6 Acetone	430	5J			71 D	1700 D	3 DJ	36 DJ	1600 D	26 DJ	3 DJ	10 D	10 D	8 DJ	9 DJ	5 J
7 Carbon Disulfide													3 J			
8 1,1-Dichloroethene							7									
9 1,1-Dichloroethane							3 J									
10 trans-1,2-Dichloroethene	94 J															6
11 Chloroform											1 J		2 J			
12 1-2-Dichloroethane									16000							
13 2-Butanone (MEK)	570		5 DJ													
14 1,1,1-Trichloroethane	43 J															
15 Carbon Tetrachloride																
16 Vinyl Acetate																
17 Bromodichloromethane																
18 1,2-Dichloropropane																
19 trans-1,3-Dichloropropene																
20 Trichloroethene	1000															
21 Dibromochloromethane																
22 1,1,2-Trichloroethane																
23 Benzene	1000			2 J		1500	41	44 J		150						94
24 cis-1,3-Dichloropropene																
25 2-Chloroethyl Vinyl Ether																
26 Bromoform																
27 4-Methyl-2-pentanone																9 J
28 2-Hexanone																
29 Tetrachloroethene																
30 1,1,2,2-Tetrachloroethane																
31 Toluene	130					400	7 D	13 DJ	760 J	•		1 DJ	1 DJ		1 DJ	5
32 Chlorobenzene	1000			350 E	990	5000	190	199	8100	570	1 J					12
33 Ethylbenzene							2 J					4 J				1 J
34 Styrene													2 J		2 J	
35 Total Xylenes	27 J					95 J	7									

Ground Water Volatiles

SITE	SITE I	SITE G	SITE G	SITE G	SITE G	BLANK	SITE H	SITE L	SITE O	SITE O	SITE O	SITE O	SITE O	SITE O	SITE O	SITE O
SAMPLE NUMBER	DC-GW-31	DC-GW-32	DC-GW-33	DC-GW-34	DC-GW-34A	DC-GW-35 *	DC-GW-36	DC-GW-37	DC-GW-38	DC-GW-38A	DC-GW-39	DC-GW-39A	DC-GW-40	DC-GW-40A	DC-GW-41	DC-GW-41A
WELL NUMBER	EE-20	EE-11	EE-G106	EE-G102	EE-G102		EE-G110	EE-G109	EE-21	EE-21	EE-22	EE-22	EE-23	EE-23	EE-24	EE-24
DATE SAMPLED	3-23-87	3-24-87	3-24-87	3-24-87	7-14-87	3-24-87	3-24-87	3-24-87	3-24-87	7-14-87	3-24-87	7-14-87	3-24-87	7-14-87	3-24-87	7-14-87
1 Chloromethane																
2 Bromomethane																
3 Vinyl Chloride																
4 Chloroethane																
5 Methylene Chloride			440			2 J		44 J			52000	31000				
6 Acetone	29 B	1700 B	210	7 BJ		13 B		650 B	7 J		38000 B	34000	6 J		10	
7 Carbon Disulfide																
8 1,1-Dichloroethene																
9 1,1-Dichloroethane												1700				
10 trans-1,2-Dichloroethene			110									14000				
11 Chloroform						1 J		730			3000 J	1800				
12 1-2-Dichloroethane											4000 J	2600				
13 2-Butanone (MEK)			560		6 BJ					13 B	62000	54000 E		11 B		
14 1,1,1-Trichloroethane			51 J								7800	5000				
15 Carbon Tetrachloride																
16 Vinyl Acetate																
17 Bromodichloromethane																
18 1,2-Dichloropropane																
19 trans-1,3-Dichloropropene																
20 Trichloroethene			800								83000	64000 E				
21 Dibromochloromethane																
22 1,1,2-Trichloroethane																
23 Benzene		460	1800				1 J	150			190000	150000 E			10	20
24 cis-1,3-Dichloropropene																
25 2-Chloroethyl Vinyl Ether																
26 Bromoform																
27 4-Methyl-2-pentanone			150					270 B			38000	20000				
28 2-Hexanone																
29 Tetrachloroethene											10000					
30 1,1,2,2-Tetrachloroethane												12000				
31 Toluene		100 BJ	83 J					970 B			15000	1300		17	1 J	
32 Chlorobenzene		2500	1200	20	36		6				150000	180000 E			5	8
33 Ethylbenzene		840										860				
34 Styrene																
35 Total Xylenes		400									4600 J	2600			2 J	

Ground Water Volatiles

SITE	SITE B	BLANK	SITE L	SITE G	SITE G	SITE G	BLANK	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	BLANK
SAMPLE NUMBER	DC-GW-16	DC-GW-17 *	DC-GW-18	DC-GW-19	DC-GW-20 $	DC-GW-21	DC-GW-22 *	DC-GW-23	DC-GW-24	DC-GW-25	DC-GW-26	DC-GW-27	DC-GW-28	DC-GW-29	DC-GW-30 *
WELL NUMBER	EE-G104		EE-G108	EE-G107	EE-G107	EE-05		EE-13	EE-12	EE-G112	EE-14	EE-15	EE-16	EE-12	
DATE SAMPLED	3-17-87	3-17-87	3-18-87	3-18-87	3-18-87	3-18-87	3-18-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87
1 Chloromethane															
2 Bromomethane															
3 Vinyl Chloride										5 J		76	790	6 J	
4 Chloroethane															
5 Methylene Chloride	5 B	1 BJ		110 BJ	250 B		2 BJ				56 J	2 J			2 J
6 Acetone	9 BJ	14 B		620 B	330 B		4 BJ	29 B	40 B	17 B	100 J	10 B	190 B	16 B	23 B
7 Carbon Disulfide															
8 1,1-Dichloroethene												10			
9 1,1-Dichloroethane												120			
10 trans-1,2-Dichloroethene				180 J	200 J						150	310	640		
11 Chloroform	3 J	1 J					1 J				110 J				
12 1-2-Dichloroethane				480	450										
13 2-Butanone (MEK)															
14 1,1,1-Trichloroethane															
15 Carbon Tetrachloride															
16 Vinyl Acetate															
17 Bromodichloromethane															
18 1,2-Dichloropropane															
19 trans-1,3-Dichloropropene															
20 Trichloroethene				320	300						270	4 J			
21 Dibromochloromethane															
22 1,1,2-Trichloroethane															
23 Benzene	1 J		1 J	4100	3700	2 J	3 J		50	20	1400	5	550	75	
24 cis-1,3-Dichloropropene															
25 2-Chloroethyl Vinyl Ether															
26 Bromoform															
27 4-Methyl-2-pentanone				1900	2200						230 J				
28 2-Hexanone							4 J								
29 Tetrachloroethene				420	350	14					470				
30 1,1,2,2-Tetrachloroethane															
31 Toluene	3 J			7300	6300	2 J	4 J				240		740	1 J	
32 Chlorobenzene	5	1 J	1 J	3100	3100	1 J	2 J		270	33	3100	120	550	390	
33 Ethylbenzene				63 J						1 J	190		58	2 J	
34 Styrene				50 J											
35 Total Xylenes				280	240 J						61 J		58		

Ground Water Volatiles

SITE	SITE D	SITE D	SITE D	SITE D	SITE D	SITE D	SITE D	SITE D	SITE D	SITE H	SITE H	SITE H	SITE H	SITE G	SITE G
SAMPLE NUMBER	DC-GW-01	DC-GW-02	DC-GW-03	DC-GW-04	DC-GW-05	DC-GW-06	DC-GW-07	DC-GW-08	DC-GW-09	DC-GW-10	DC-GW-11	DC-GW-12	DC-GW-13	DC-GW-14	DC-GW-15
WELL NUMBER	EE-06	EE-07	EE-09	EE-10	EE-17	EE-08	EE-19	EE-19	EE-18	EE-01	EE-02	EE-03	EE-04	EE-G101	EE-G102
DATE SAMPLED	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-17-87	3-17-87	3-17-87	3-17-87	3-17-87	3-17-87
1 Chloromethane															
2 Bromomethane															
3 Vinyl Chloride															
4 Chloroethane															
5 Methylene Chloride							23 J	61 J	2200 BJ		140 J	16 J	68	6 B	1 BJ
6 Acetone	15	9 BJ	10 B	14 B	12 B	13 B	400 B	210 B	7100 B	170 BJ	910 BJ	8 J	9 BJ		
7 Carbon Disulfide															
8 1,1-Dichloroethene															
9 1,1-Dichloroethane															
10 trans-1,2-Dichloroethene		1 J			4 J										
11 Chloroform					1 J						3000			2 J	9
12 1-2-Dichloroethane									3000						
13 2-Butanone (MEK)															
14 1,1,1-Trichloroethane															
15 Carbon Tetrachloride															
16 Vinyl Acetate															
17 Bromodichloromethane															1 J
18 1,2-Dichloropropane															
19 trans-1,3-Dichloropropene															
20 Trichloroethene					2 J										
21 Dibromochloromethane															
22 1,1,2-Trichloroethane															
23 Benzene	9	24	1 J	14	1 J	1 J	2000	2000	2000 J	1900	4300	2 J		1 J	
24 cis-1,3-Dichloropropene															
25 2-Chloroethyl Vinyl Ether															
26 Bromoform															
27 4-Methyl-2-pentanone							250	290	2700 J	140 J	3600				
28 2-Hexanone		5 J							3500 J						
29 Tetrachloroethene															
30 1,1,2,2-Tetrachloroethane															
31 Toluene		4 J					450	410	1600 J	48 J	7300			2 J	
32 Chlorobenzene	14	1 J	33	380 E	29	7	1500	1400	6700 J	1600	11000	11			5
33 Ethylbenzene		1 J					33 J	28 J		210		1 J			
34 Styrene															
35 Total Xylenes	2	230					180	160		64 J	120 J				

APPENDIX D

ANALYTICAL RESULTS

Explanation For Analytical Data Summary Tables

All ground water results in ug/l.
All soil/sediment organic results in ug/kg
All soil/ sediment inorganic results in mg/kg

For sample location headings, the following qualifiers are used :

- \+ Denotes blank samples.
- * Denotes duplicate samples.
- ^ Denotes that sample was not analyzed for the compounds listed.

For chemical results, the folling qualifiers are used :

- B Compound detected in blank samples.
- J Estimated value . Result is less than the specified detection limit, but greater than zero.
- E Estimated value. Concentration detected exceeds the calibrated range.
- C Result confirmed by GC/MS.
- * Duplicate analysis not with in control limits.
- R Spike sample recovery not with in control limits.

Table. Air volume calculation of samples collected by low volume sampler Contd.

prepared by [illegible] 2-23-88

Sample No.	Date	Station No	Elapse Time (min.)	Average Flow Rate (ml/min)	Total Air volume (m^3)	Total Air (m^3) standard Temp Pres
DC-CT-15	7/21/87	EE2	506	544.45	0.275	0.277
DC-PT-15		EE2	504	986.4	0.497	0.501
DC-CT-16		EE3	515	568.3	0.293	0.296
DC-PT-16		EE3	515	377	0.194	0.196
DC-CT-17		EE4	505	550.5	0.278	0.280
DC-PT-17		"	505	343.9	0.174	0.176
DC-CT-18		EE6	505	492.2	0.248	0.250
DC-PT-18		EE6	505	999.9	0.505	0.509
DC-CT-19		EE5	506	502	0.254	0.256
DC-PT-19		"	506	918.9	0.465	0.469
DC-CT-22	7-22-87	EE2	500	535.2	0.268	0.269
DC-PT-22		"	500	972.75	0.486	0.488
DC-CT-23		EE3	482	536.5	0.259	0.260
DC-PT-23		"	482	189.4	.091	.091
DC-CT-24		EE4	482	489.6	0.236	0.237
DC-PT-24		"	482	180.15	.089	.089
DC-CT-25		EE6	484	518	0.251	0.252
DC-PT-25		"	"	992.6	0.48	0.482
DC-CT-26		EE5	483	516.95	0.25	0.251
		"	"	903.3	0.436	0.438

Table: Air volume Calculations of samples Collected by low volume Samples

prepared by MC 2-23-88

Sample NO		Shelter NO.	Elapse Time (min)	Average flow rate (ml/min)	Total Air volume (m^3)	* Total Air Standard Temp. & press. (m^3)
DC-CT-02	(7/14/87)	EE2	480	464.9	0.223	0.225
DC-PT-02			480	1059	0.508	0.5120
DC-CT-03		EE3	478	562.85	0.269	0.271
DC-PT-03			478	1090.65	0.521	0.525
DC-CT-01		EE1	482	499	0.241	0.243
DC-PT-01		"	482	789.5	0.38	0.383
DC-CT-06		EE6	478	352.75	0.169	0.170
DC-PT-06		"	478	1065	0.509	0.513
DC-CT-05		EE5	477	468.9	0.224	0.226
DC-PT-05		EE5	477	1019.15	0.486	0.489
DC-CT-08	7/17/87	EE2	491	512.1	0.251	0.252
DC-PT-08		"	491	991.95	0.487	0.490
DC-CT-09		EE3	486	559.5	0.272	0.274
DC-PT-09		EE3	486	717.6	0.349	0.351
DC-CT-010		EE1	481	500.55	0.241	0.242
DC-PT-10		EE1	481	622.35	0.299	.301
DC-CT-11		EE6	478	393.7	0.188	0.189
DC-PT-11		EE6	478	1100	0.526	0.529
DC-CT-12		EE5	476	505.6	0.241	0.242
DC-PT-12		EE5	476	988.85	0.471	0.474

(1)

$$V_{std} = \underbrace{\frac{T_s}{P_s} * \frac{P}{T}}_{} * V$$

Correction factor for standard Temp & pres. (See attached table for the coefficient)

Low Volume Sampler
Air Volume Calculations and
Calibration Data

prepared by mC
2-23-88

Correction Factors for Calculation of Air volume at Standard Temperature and pressure

Shelter NO	Date	Correction Factor for Standard (1) Temp. & pres. Start of test	End of Test	Avg value
EE1	7/16/87	1.02	0.994	1.007
〃	7/17/87	1.02	0.991	1.006
〃	7/21/87	1.018	1.0	1.009
〃	7/22/87	1.015	0.995	1.005
EE2	7/16/87	1.02	0.994	1.007
〃	7/17/87	1.02	0.991	1.006
〃	7/21/87	1.018	1.0	1.009
〃	7/22/87	1.015	0.995	1.005
EE3	7/16/87	1.02	0.994	1.007
〃	7/17/87	1.02	0.991	1.006
〃	7/21/87	1.018	1.0	1.009
〃	7/22/87	1.015	0.995	1.005
EE4	7/16/87	1.02	0.994	1.007
〃	7/17/87	1.02	0.991	1.006
〃	7/21/87	1.018	1.0	1.009
〃	7/22/87	1.015	0.995	1.005
EE5	7/16/87	1.02	0.994	1.007
〃	7/17/87	1.02	0.991	1.006
〃	7/21/87	1.018	1.0	1.009
〃	7/22/87	1.015	0.995	1.005
EE6	7/16/87	1.02	0.994	1.007
〃	7/17/87	1.02	0.991	1.006
〃	7/21/87	1.018	1	1.009
〃	7/22/87	1.015	0.995	1.005

1) square root of these coefficients were used in the calculation of air volume of samples collected by high volume samplers

Ground Water Inorganics

SITE	SITE B	SITE B	SITE B	SITE R	SITE R	SITE R	SITE R	SITE R	SITE R	SITE R	BLANK	PRIVATE	PRIVATE	PRIVATE	PRIVATE	PRIVATE	BLANK
SAMPLE NUMBER	BC-GW-42 &	BC-GW-43	BC-GW-43A	BC-GW-44	BC-GW-45	BC-GW-46	BC-GW-47	BC-GW-48	BC-GW-49	BC-GW-50	BC-GW-51+	BC-GW-52	BC-GW-53	BC-GW-54	BC-GW-55	BC-GW-56	BC-GW-57
WELL NUMBER	EE-24	EE-25	EE-25	P-1	D-20A	P-7	D-26A	D-26A	D-25A	P-11		WRIGHT	SETTLES	SCHMIDT	McDONALD	CLAYTON	
DATE SAMPLED	3-24-87	3-24-87	7-14-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-26-87	3-26-87	3-26-87	3-26-87	3-26-87	7-14-87
1 Aluminum																	
2 Antimony																	
3 Arsenic	23			34	41		40	45		35				11	26		
4 Barium	(100)	108	(92)	440	(123)	(27)	(190)	201		(160)		(73)	(89)	292	(117)	300	
5 Beryllium																	
6 Boron																	
7 Cadmium																	
8 Chromium, trivalent																	
9 Cobalt						120											
10 Copper													(10)	115			
11 Iron	36600	3930	2360	10000	20000	15500	26900	27500		11800		2990	4600	21600	10600	17400	(87)
12 Lead											(91)		12 R	18 R			
13 Manganese	4300	2300	1320	2190	6040	11200	3530	3570		2640		1060	665	1660	257	1950	
14 Mercury														0.2			
15 Nickel						(10)											
16 Selenium																	
17 Silver																	
18 Thallium																	
19 Tin																	
20 Vanadium						(10)											
21 Zinc	34	26	24	45 R	24 R	102 R	41 R	62 R		39 R	(10)	4140 R	2000 R	377 R	1350 R		
22 Cyanide										14							

Ground Water Inorganics

SITE

SAMPLE NUMBER
WELL NUMBER
DATE SAMPLED

1 Aluminum
2 Antimony
3 Arsenic
4 Barium
5 Beryllium
6 Boron
7 Cadmium
8 Chromium, trivalent
9 Cobalt
10 Copper
11 Iron
12 Lead
13 Manganese
14 Mercury
15 Nickel
16 Selenium
17 Silver
18 Thallium
19 Tin
20 Vanadium
21 Zinc
22 Cyanide

Surface Water Volatiles

SITE	SITE H	SITE H	SITE H	CS-B	CS-B	CS-B	CS-C	CS-C	CS-D	CS-D		CS-A	CS-A
SAMPLE NUMBER	BC-SW-01 *	BC-SW-02	BC-SW-03	BC-SW-04	BC-SW-05	BC-SW-06 *	BC-SW-07	BC-SW-08	BC-SW-09	BC-SW-10	BC-SW-11 *	BC-SW-12	BC-SW-13
DATE	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-6-86	11-6-86	11-6-86
1 Chloromethane													
2 Bromomethane													
3 Vinyl Chloride													
4 Chloroethane													
5 Methylene Chloride	6 B	3 BJ	3 BJ	3 BJ	3 BJ	3 BJ	3 BJ	6 B	5 B	7 B	6 B	4 BJ	4
6 Acetone	12 B		7 BJ	9 BJ	12 B	11 B	13 B	13 B	11 B	11 B	17 B	20 B	6
7 Carbon Disulfide													
8 1,1-Dichloroethene													
9 1,1-Dichloroethane													3
10 trans-1,2-Dichloroethene													
11 Chloroform	27										25	8	7
12 1-2-Dichloroethane													
13 2-Butanone (MEK)													
14 1,1,1-Trichloroethane												33	41
15 Carbon Tetrachloride													31
16 Vinyl Acetate													
17 Bromodichloromethane													
18 1,2-Dichloropropane													
19 trans-1,3-Dichloropropene													
20 Trichloroethene												6	16
21 Dibromochloromethane													
22 1,1,2-Trichloroethane													
23 Benzene												1 J	
24 cis-1,3-Dichloropropene													
25 2-Chloroethyl Vinyl Ether													
26 Bromoform													
27 4-Methyl-2-pentanone												6 J	
28 2-Hexanone													
29 Tetrachloroethene													
30 1,1,2,2-Tetrachloroethane													
31 Toluene													
32 Chlorobenzene												2 J	
33 Ethylbenzene													
34 Styrene													
35 Total Xylenes												2 J	

Surface Water Semivolatiles

SITE	BLANK	SITE N	SITE N	CS-B	CS-B	CS-B	CS-C	CS-C	CS-D	CS-D	BLANK	CS-A	CS-A
SAMPLE NUMBER	DC-SW-01 *	DC-SW-02	DC-SW-03	DC-SW-04	DC-SW-05	DC-SW-06 #	DC-SW-07	DC-SW-08	DC-SW-09	DC-SW-10	DC-SW-11 *	DC-SW-12 *	DC-SW-13
DATE	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-6-86	11-6-86	11-6-86
1 Phenol													
2 bis(2-Chloroethyl)ether													
3 2-Chlorophenol													
4 1,3-Dichlorobenzene													
5 1,4-Dichlorobenzene													
6 Benzyl Alcohol													
7 1,2-Dichlorobenzene													
8 2-Methylphenol													
9 bis(2-Chloroisopropyl) ether													
10 4-Methylphenol													
11 N-Nitroso-n-Dipropylamine													
12 Hexachloroethane													
13 Nitrobenzene													
14 Isophorone													
15 2-Nitrophenol													
16 2,4-Dimethylphenol													
17 Benzoic Acid													
18 bis-(2-Chloroethoxy)methane													
19 2,4-Dichlorophenol													
20 1,2,4-Trichlorobenzene													
21 Naphthalene													
22 4-Chloroaniline												3 J	
23 Hexachlorobutadiene													
24 4-Chloro-3-methylphenol													
25 2-Methylnaphthalene													
26 Hexachlorocyclopentadiene													
27 2,4,6-Trichlorophenol													
28 2,4,5-Trichlorophenol													
29 2-Chloronaphthalene													
30 2-Nitroaniline				9 J									

Surface Water Semivolatiles

SITE	BLANK	SITE H	SITE H	CS-D	CS-D	CS-B	CS-C	CS-C	CS-D	CS-D	BLANK	CS-A	CS-A
SAMPLE NUMBER	BC-SW-01 *	BC-SW-02	BC-SW-03	BC-SW-04	BC-SW-05	BC-SW-06 B	BC-SW-07	BC-SW-08	BC-SW-09	BC-SW-10	BC-SW-11 *	BC-SW-12	BC-SW-13
DATE	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-6-86	11-6-86	11-6-86
1 Dimethyl Phthalate													
2 Acenaphtylene													
3 3-Nitroaniline													
4 Acenaphthene													
5 2,4-Dinitrophenol													
6 4-Nitrophenol													
7 Dibenzofuran													
8 2,4-Dinitrotoluene													
9 2,6-Dinitrotoluene													
10 Diethylphthalate							1 J						
11 4-Chlorophenyl-Phenylether													
12 Fluorene													
13 4-Nitroaniline													
14 4,6-Dinitro-2-methylphenol													
15 N-Nitrosodiphenylamine													
16 4-Bromophenyl-phenylether													
17 Hexachlorobenzene													
18 Pentachlorophenol													
19 Phenanthrene												4 J	
20 Anthracene													
21 Di-n-butyl phthalate	15 B	26 B	25 B	18 B	15 B	16 B	19 B	19 B	19 B	20 B	17 B	5 BJ	27 B
22 Fluoranthene													
23 Pyrene													
24 Butyl Benzyl phthalate												12 J	
25 3,3'-Dichlorobenzidine													
26 Benzo(a)Anthracene													
27 bis(2-ethylhexyl) phthalate												7 J	5 J
28 Chrysene													
29 Di-n-octyl phthalate		4 J	2 J							1 J		36 J	1 J
30 Benzo(b)Fluoranthene													
31 Benzo(k)Fluoranthene													
32 Benzo(a)Pyrene													
33 Indeno(1,2,3-cd)Pyrene													
34 Benzo(g,h,i)Perylene													
35 Dibenz(a,h)Anthracene													

Surface Water Pest/PCBs

SITE	BLANK	SITE H	SITE H	CS-B	CS-B	CS-B	CS-C	CS-C	CS-D	CS-D	BLANK	CS-A	CS-A
SAMPLE NUMBER	BC-SW-01 *	BC-SW-02	BC-SW-03	BC-SW-04	BC-SW-05	BC-SW-06 *	BC-SW-07	BC-SW-08	BC-SW-09	BC-SW-10	BC-SW-11 *	BC-SW-12	BC-SW-13
DATE	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-6-86	11-6-86	11-6-86
1 Alpha-BHC													
2 Beta-BHC													
3 Delta-BHC													
4 Gamma-BHC (Lindane)													
5 Heptachlor													
6 Aldrin													
7 Heptachlor Epoxide													
8 Edosulfan I													
9 Dieldrin													
10 4,4'-DDE													
11 Endrin													
12 Edosulfan II													
13 4,4'-DDD													
14 Endosulfan Sulfate													
15 4,4'-DDT													
16 Methoxychlor													
17 Endrin Ketone													
18 Chlordane													
19 Toxaphene													
20 AROCLOR-1016													
21 AROCLOR-1221													
22 AROCLOR-1232													
23 AROCLOR-1242													
24 AROCLOR-1248													
25 AROCLOR-1254													
26 AROCLOR-1260				3.6	34	44							

Surface-Water Inorganic

SITE	BLANK	SITE H	SITE H	CS-B	CS-B	CS-B	CS-C	CS-C	CS-D	CS-D	BLANK	CS-A	CS-A
SAMPLE NUMBER	BC-SW-01 *	BC-SW-02	BC-SW-03	BC-SW-04	BC-SW-05	BC-SW-06 1	BC-SW-07	BC-SW-08	BC-SW-09	BC-SW-10	BC-SW-11 *	BC-SW-12	BC-SW-13
DATE	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-6-86	11-6-86	11-6-86
1 Aluminum		464		1090	204	9000		767	5000	1190	323	354	294
2 Antimony												115	
3 Arsenic						31							
4 Barium		300				7130			274				
5 Beryllium													
6 Boron													
7 Cadmium						25			0.1			75	23
8 Chromium, trivalent		14				99			12			81	65
9 Cobalt													
10 Copper		51	46	660	239	17900	226	84	619	57		7030	2410
11 Iron	255	937	350	1510	495	24500	520	2790	7470	1570		2040	724
12 Lead		6.4		77	17	1300	710	30	89	36		3060	76
13 Manganese		97	95	108	66	222	141	234	196	20		60	252
14 Mercury				0.6			1.9	0.2	0.26			0.59	0.2
15 Nickel		46				1500	83		109			2600	667
16 Selenium													
17 Silver												16	
18 Thallium													
19 Tin						60		40				499	
20 Vanadium													
21 Zinc		106	73	404	302	10300	537	247	1090	105		1450	400
22 Cyanide													

Sediment Volatiles

SITE	CS-B	CS-B	SITE M	SITE M	SITE M	CS-B	CS-B	CS-B	CS-C	CS-C	CS-C	CS-C	CS-B	CS-B	CS-B
SAMPLE NUMBER	DC-SD-13 B	DC-SD-14	DC-SD-15	DC-SD-16	DC-SD-17	DC-SD-18 B	DC-SD-19	DC-SD-20	DC-SD-21	DC-SD-22	DC-SD-23	DC-SD-24	DC-SD-25	DC-SD-26	DC-SD-27
SAMPLE DEPTH	0-6"	2'-3'	0-6"	0-6"	0-6"	0-6"	0-6"	1.5'-2'	0-6"	2'-2.5'	0-6"	2'-2.5	0-6"	1.5 -2	0-6"
DATE SAMPLED	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11 5 86
1 Chloromethane															
2 Bromomethane															
3 Vinyl Chloride															
4 Chloroethane															
5 Methylene Chloride	11000 B	2200 B	7800 B	10000 B	8400 B	12000 B	13000 B	14000 B	19000 B	18000 B	27600 B	17000 B	23000 B	19000 B	43000 B
6 Acetone	15000 B	820	4900 B	5100 B	5600 B	4100 JB	10000 B	6100 B	6400 B	9900 B	15000 B	7300 B	18000 B	9800 B	36000 B
7 Carbon Disulfide															
8 1,1-Dichloroethene															
9 1,1-Dichloroethane															
10 trans-1,2-Dichloroethene															
11 Chloroform															
12 1-2-Dichloroethane															
13 2-Butanone (MEK)	21000 B	510	11000	14000	13000	14000	14000	10000 B	11000 B	14000 B	22000 B	12000 B	21000 B	16000 B	35000 B
14 1,1,1-Trichloroethane															
15 Carbon Tetrachloride															
16 Vinyl Acetate															
17 Bromodichloromethane															
18 1,2-Dichloropropane															
19 trans-1,3-Dichloropropene															
20 Trichloroethene															
21 Dibromochloromethane															
22 1,1,2-Trichloroethane															
23 Benzene		87 J													
24 cis-1,3-Dichloropropene															
25 2-Chloroethyl Vinyl Ether															
26 Bromoform															
27 4-Methyl-2-pentanone		220 J													
28 2-Hexanone							52000 B			1200 J					
29 Tetrachloroethene															
30 1,1,2,2-Tetrachloroethane															
31 Toluene		810													
32 Chlorobenzene		5200													
33 Ethylbenzene		3600													
34 Styrene															
35 Total Xylenes		990													

INORGANICS GROUND-WATER

SITE	SITE I	SITE G	SITE G	SITE G	SITE G	BLANK	SITE H	SITE L	SITE O	SITE O	SITE O	SITE O	SITE O	SITE O	SITE O	SITE O
SAMPLE NUMBER	DC-GW-31	DC-GW-32	DC-GW-33	DC-GW-34	DC-GW-34A	DC-GW-35 •	DC-GW-36	DC-GW-37	DC-GW-38	DC-GW-38A	DC-GW-39	DC-GW-39A	DC-GW-40	DC-GW-40A	DC-GW-41	DC-GW-41A
WELL NUMBER	EE-20	EE-11	EE-6106	EE-6102	EE-6102		EE-110	EE-6109	EE-21	EE-21	EE-22	EE-22	EE-23	EE-23	EE-24	EE-24
DATE SAMPLED	3-23-87	3-24-87	3-24-87	3-24-87	7-14-87	3-24-87	3-24-87	3-24-87	3-24-87	7-14-87	3-24-87	7-14-87	3-24-87	7-14-87	3-24-87	7-14-87
1 Aluminum		85								200						
2 Antimony																
3 Arsenic		870	34	27				14000	16		133	123	25	17	18	15
4 Barium			192	40	(51)		173		159	(35)	536	500	(161)	(152)	(170)	204
5 Beryllium																
6 Boron																
7 Cadmium								32			8	11				
8 Chromium, trivalent			41													
9 Cobalt					(10)			84								
10 Copper																
11 Iron	124	43800	49500	3850	2060	111	2160	523000	20400	15900	147000	171000	19600	16800	36400	29200
12 Lead										3270		6350				
13 Manganese		2290	3900	1460	1510		274	7660	4340		5460		1270	1330	4110	1520
14 Mercury																
15 Nickel			37	72			111									
16 Selenium																
17 Silver																
18 Thallium																
19 Tin																
20 Vanadium								159			42	55			504	
21 Zinc		129	58	14	31	10	53	2210	41	57	101	60	95	(15)	23	24
22 Cyanide		26							20							

Ground Water Inorganics

SITE	SITE B	BLANK	SITE L	SITE G	SITE G	SITE B	BLANK	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	BLANK
SAMPLE NUMBER	BC-GW-16	BC-GW-17 *	BC-GW-18	BC-GW-19	BC-GW-20 #	BC-GW-21	BC-GW-22 *	BC-GW-23	BC-GW-24	BC-GW-25	BC-GW-26	BC-GW-27	BC-GW-28	BC-GW-29 #	BC-GW-30 *
WELL NUMBER	EE-G104		EE-G108	EE-G107	EE-G107	EE-05		EE-13	EE-12	EE-G112	EE-14	EE-15	EE-16	EE-12	
DATE SAMPLED	3-17-87	3-17-87	3-18-87	3-18-87	3-18-87	3-18-87	3-18-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87
1 Aluminum															
2 Antimony															
3 Arsenic				14	12			12		20	15	12			
4 Barium			331	610	500					223			956		
5 Beryllium															
6 Boron															
7 Cadmium				22 R	22 R										
8 Chromium, trivalent				24	23										
9 Cobalt				500	572										
10 Copper															
11 Iron	1110		21900	247000	241000			25400	23300	10000	24100	16500	9540	24900	107
12 Lead															
13 Manganese	103		1200	7240	6050	286		1520	1550	1650	1260	1270	1750	1500	
14 Mercury															
15 Nickel				349	320						95				
16 Selenium															
17 Silver															
18 Thallium															
19 Tin															
20 Vanadium				93	94										
21 Zinc	24		24	1910	1020	26					25	26			
22 Cyanide						330									

Ground Water Inorganics

SITE	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	SITE H	SITE H	SITE H	SITE H	SITE G	SITE G
SAMPLE NUMBER	BC-GW-01	BC-GW-02	BC-GW-03	BC-GW-04	BC-GW-05	BC-GW-06	BC-GW-07	BC-GW-08 I	BC-GW-09	BC-GW-10	BC-GW-11	BC-GW-12	BC-GW-13	BC-GW-14	BC-GW-15
WELL NUMBER	EE-06	EE-07	EE-09	EE-10	EE-17	EE-08	EE-19	EE-19	EE-18	EE-01	EE-02	EE-03	EE-04	EE-G101	EE G103
DATE SAMPLED	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-17-87	3-17-87	3-17-87	3-17-87	3-17-87	3-17-87
1 Aluminum											11000				
2 Antimony															63 R
3 Arsenic	64	82	18	100			11	11	15		8490	26			
4 Barium	304	482		350		336								219	
5 Beryllium															
6 Boron															
7 Cadmium											70 R				
8 Chromium, trivalent									13		24				
9 Cobalt									148		758				
10 Copper											2410				
11 Iron	8960	54000	15800	20000	571	11300	36700	36500	41200	29600	104000	34900		1280	1150
12 Lead											28 R				
13 Manganese	1520	1600	322	1090	1640	13200	2660	2600	6630	907	8020	1030	1800	2230	242
14 Mercury														1.4	2.1
15 Nickel	64	74							112	261	17200				
16 Selenium															
17 Silver															
18 Thallium															
19 Tin															
20 Vanadium															
21 Zinc	25	326	26	22	313	40	172	171	4.31	57	6840	25	24	31	42
22 Cyanide	1569									480	21			157	101

Ground Water Pest/PCBs

	SITE	PRIVATE	BLANK
	SAMPLE NUMBER	BC-GW-36	BC-GW-37 +
	WELL NUMBER	CLAYTON	
	DATE SAMPLED	3-26-87	7-14-87
1	Alpha-BHC		
2	Beta-BHC		
3	Delta-BHC		
4	Gamma-BHC (Lindane)		
5	Heptachlor		
6	Aldrin		
7	Heptachlor Epoxide		
8	Endosulfan I		
9	Dieldrin		
10	4,4'-DDE		
11	Endrin		
12	Endosulfan II		
13	4,4'-DDD		
14	Endosulfan Sulfate		
15	4,4'-DDT		
16	Methoxychlor		
17	Endrin Ketone		
18	Chlordane		
19	Toxaphene		
20	AROCLOR-1016		
21	AROCLOR-1221		
22	AROCLOR-1232		
23	AROCLOR-1242		
24	AROCLOR-1248		
25	AROCLOR-1254		
26	AROCLOR-1260		

Ground Water Semivolatiles

SITE	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	SITE N	SITE N	SITE N	SITE N	SITE G	SITE G	SITE G
SAMPLE NUMBER	BC-GW-01	BC-GW-02	BC-GW-03	BC-GW-04	BC-GW-05	BC-GW-06	BC-GW-07	BC-GW-008	BC-GW-09	BC-GW-10	BC-GW-11	BC-GW-12	BC-GW-13	BC-GW-14	BC-GW-15	BC-GW-16
WELL NUMBER	EE-06	EE-07	EE-09	EE-10	EE-17	EE-08	EE-19	EE-19	EE-18	EE-01	EE-02	EE-03	EE-04	EE-G101	EE-G103	EE-G104
DATE SAMPLED	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-16-87	3-17-87	3-17-87	3-17-87	3-17-87	3-17-87	3-17-87	3-17-87
1 Dimethyl Phthalate											8 J					
2 Acenaphtylene																
3 3-Nitroaniline							3900		460 J							
4 Acenaphthene																
5 2,4-Dinitrophenol																
6 4-Nitrophenol									80 J							
7 Dibenzofuran										6 J						
8 2,4-Dinitrotoluene																
9 2,6-Dinitrotoluene																
10 Diethylphthalate											22 J					
11 4-Chlorophenyl-Phenylether										20 J						
12 Fluorene																
13 4-Nitroaniline																
14 4,6-Dinitro-2-methylphenol																
15 N-Nitrosodiphenylamine										800						
16 4-Bromophenyl-phenylether																
17 Hexachlorobenzene																
18 Pentachlorophenol							20000 E	33000 E	310	630						
19 Phenanthrene										15 J						
20 Anthracene																
21 Di-n-butyl phthalate	12 BJ	8 BJ	5 BJ	8 BJ	5 BJ	5 BJ									2 BJ	
22 Fluoranthene																
23 Pyrene																
24 Butyl Benzyl phthalate																
25 3,3'-Dichlorobenzidine																
26 Benzo(a)Anthracene														32		
27 bis(2-ethylhexyl) phthalate	95	160	32		26						24 J					24
28 Chrysene														6 J		
29 Di-n-octyl phthalate		7 J	4 J			2 J										
30 Benzo(b)Fluoranthene																
31 Benzo(k)Fluoranthene																
32 Benzo(a)Pyrene																
33 Indeno(1,2,3-cd)Pyrene																
34 Benzo(g,h,i)Perylene																
35 Dibenz(a,h)Anthracene																

Ground Water Semivolatiles

SITE	SITE B	SITE A	SITE A	SITE A	SITE A	SITE A	SITE A	SITE A	BLANK	PRIVATE	PRIVATE	PRIVATE	PRIVATE	PRIVATE	BLANK
SAMPLE NUMBER	DC-GW-43A	DC-GW-44	DC-GW-45	DC-GW-46	DC-GW-47	DC-GW-48B	DC-GW-49	DC-GW-50	DC-GW-51+	DC-GW-52	DC-GW-53	DC-GW-54	DC-GW-55	DC-GW-56	DC-GW-57 +
WELL NUMBER	EE-25	P-1	B-20A	P-7	B-26A	B-26A	B-25A	P-11		WRIGHT	SETTLES	SCHMIDT	McDONALD	CLAYTON	
DATE SAMPLED	7-14-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-26-87	3-26-87	3-26-87	3-26-87	3-26-87	7-14-87
1 Dimethyl Phthalate															
2 Acenaphthylene															
3 3-Nitroaniline															
4 Acenaphthene															
5 2,4-Dinitrophenol															
6 4-Nitrophenol															
7 Dibenzofuran															
8 2,4-Dinitrotoluene															
9 2,6-Dinitrotoluene															
10 Diethylphthalate															
11 4-Chlorophenyl-Phenylether															
12 Fluorene															
13 4-Nitroaniline															
14 4,6-Dinitro-2-methylphenol															
15 N-Nitrosodiphenylamine															
16 4-Bromophenyl-phenylether															
17 Hexachlorobenzene															
18 Pentachlorophenol															
19 Phenanthrene															
20 Anthracene															
21 Di-n-butyl phthalate		7 J													
22 Fluoranthene															
23 Pyrene															
24 Butyl Benzyl phthalate															
25 3,3'-Dichlorobenzidine															
26 Benzo(a)Anthracene															
27 bis(2-ethylhexyl) phthalate			4 J		37	4			4 J						
28 Chrysene															
29 Di-n-octyl phthalate			4 J		40	26			5 J	2 J		2 J	4 J	6 J	
30 Benzo(b)Fluoranthene															
31 Benzo(k)Fluoranthene															
32 Benzo(a)Pyrene															
33 Indeno(1,2,3-cd)Pyrene															
34 Benzo(g,h,i)Perylene															
35 Dibenz(a,h)Anthracene															

Ground Water Semivolatiles

SITE	SITE G	SITE G	SITE G	BLANK	SITE H	SITE L	SITE O	SITE O	SITE D	SITE O	SITE O	SITE O	SITE O	SITE O	SITE O	SITE O
SAMPLE NUMBER	DC-GW-33	DC-GW-34	DC-GW-34A	DC-GW-35 *	DC-GW-36	DC-GW-37	DC-GW-38	DC-GW-38A	DC-GW-39	DC-GW-39A	DC-GW-40	DC-GW-40A	DC-GW-41	DC-GW-41A	DC-GW-42 *	DC-GW-43
WELL NUMBER	EE-G106	EE-G102	EE-G102		EE-G110	EE-G109	EE-21	EE-21	EE-22	EE-22	EE-23	EE-23	EE-24	EE-24	EE-24	EE-25
DATE SAMPLED	3-24-87	3-24-87	7-14-87	3-24-87	3-24-87	3-24-87	3-24-87	7-14-87	3-24-87	7-14-87	3-24-87	7-14-87	3-24-87	7-14-87	3-24-87	3-24-87
1 Dimethyl Phthalate																
2 Acenaphtylene																
3 3-Nitroaniline																
4 Acenaphthene																
5 2,4-Dinitrophenol																
6 4-Nitrophenol																
7 Dibenzofuran																
8 2,4-Dinitrotoluene																
9 2,6-Dinitrotoluene																
10 Diethylphthalate																
11 4-Chlorophenyl-Phenylether																
12 Fluorene																
13 4-Nitroaniline																
14 4,6-Dinitro-2-methylphenol																
15 N-Nitrosodiphenylamine																
16 4-Bromophenyl-phenylether																
17 Hexachlorobenzene																
18 Pentachlorophenol									23 J							
19 Phenanthrene																
20 Anthracene																
21 Di-n-butyl phthalate	12 B			6 BJ		6 BJ							10 B	7 J	10 B	
22 Fluoranthene																
23 Pyrene																
24 Butyl Benzyl phthalate																
25 3,3'-Dichlorobenzidine																
26 Benzo(a)Anthracene																
27 bis(2-ethylhexyl) phthalate	4 BJ			2 BJ									3 BJ			
28 Chrysene																
29 Di-n-octyl phthalate	2 BJ			3 BJ									2 BJ		11 B	
30 Benzo(b)Fluoranthene																
31 Benzo(k)Fluoranthene																
32 Benzo(a)Pyrene																
33 Indeno(1,2,3-cd)Pyrene																
34 Benzo(g,h,i)Perylene																
35 Dibenz(a,h)Anthracene																

Ground Water Semivolatiles

SITE	BLANK	SITE L	SITE 6	SITE 6	SITE 8	BLANK	SITE 1	SITE 1	SITE 1	SITE 1	SITE 1	SITE 1	SITE 1	BLANK	SITE 1	SITE 6
SAMPLE NUMBER	DC-GW-17*	DC-GW-18	DC-GW-19	DC-GW-20*	DC-GW-21	DC-GW-22*	DC-GW-23	DC-GW-24	DC-GW-25	DC-GW-26	DC-GW-27	DC-GW-28	DC-GW-29	DC-GW-30*	DC-GW-31	DC-GW-[illegible]
WELL NUMBER		EE-G100	EE-G107	EE-G107	EE-05		EE-13	EE-12	EE-G112	EE-14	EE-15	EE-16	EE-12		EE-[illegible]	EE-11
DATE SAMPLED	3-17-87	3-10-87	3-10-87	3-10-87	3-10-87	3-10-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87	[illegible]-24-87
1 Dimethyl Phthalate																98
2 Acenaphtylene																
3 3-Nitroaniline																
4 Acenaphthene																
5 2,4-Dinitrophenol																
6 4-Nitrophenol																
7 Dibenzofuran																
8 2,4-Dinitrotoluene																
9 2,6-Dinitrotoluene																
10 Diethylphthalate									23 B		13 B	140 B		13 B	8 BJ	
11 4-Chlorophenyl-Phenylether																
12 Fluorene																
13 4-Nitroaniline												25 J				
14 4,6-Dinitro-2-methylphenol																
15 N-Nitrosodiphenylamine																
16 4-Bromophenyl-phenylether																
17 Hexachlorobenzene					6 J											
18 Pentachlorophenol			1300 J	6300	12 J				6 J	2400	7 J	60 J				
19 Phenanthrene																
20 Anthracene											2 JB					
21 Di-n-butyl phthalate		9 BJ			10 B		2 JB	7 BJ	2 JB					2 JB	4 BJ	
22 Fluoranthene																
23 Pyrene																
24 Butyl Benzyl phthalate																
25 3,3'-Dichlorobenzidine																
26 Benzo(a)Anthracene																
27 bis(2-ethylhexyl) phthalate		18 B			10 B	4 BJ	2 JB	5 BJ	3 JB		2	20 BJ		2 JB	3 BJ	
28 Chrysene																
29 Di-n-octyl phthalate														1 J		
30 Benzo(b)Fluoranthene																
31 Benzo(k)Fluoranthene																
32 Benzo(a)Pyrene																
33 Indeno(1,2,3-cd)Pyrene																
34 Benzo(g,h,i)Perylene																
35 Dibenz(a,h)Anthracene																

Ground Water Semivolatiles

SITE	PRIVATE	PRIVATE	PRIVATE	BLANK
SAMPLE NUMBER	BC-GW-54	BC-GW-55	BC-GW-56	BC-GW-57 +
WELL NUMBER	SCHMIDT	McDONALD	CLAYTON	
DATE SAMPLED	3-26-87	3-26-87	3-26-87	7-14-87
1 Phenol				
2 bis(2-Chloroethyl)ether				
3 2-Chlorophenol				
4 1,3-Dichlorobenzene				
5 1,4-Dichlorobenzene			5 J	
6 Benzyl Alcohol				
7 1,2-Dichlorobenzene			3 J	
8 2-Methylphenol				
9 bis(2-Chloroisopropyl) ether				
10 4-Methylphenol				
11 N-Nitroso-n-Dipropylamine				
12 Hexachloroethane				
13 Nitrobenzene				
14 Isophorone				
15 2-Nitrophenol				
16 2,4-Dimethylphenol				
17 Benzoic Acid				
18 bis-(2-Chloroethoxy)methane				
19 2,4-Dichlorophenol				
20 1,2,4-Trichlorobenzene				
21 Naphthalene				
22 4-Chloroaniline				
23 Hexachlorobutadiene				
24 4-Chloro-3-methylphenol				
25 2-Methylnaphthalene				
26 Hexachlorocyclopentadiene				
27 2,4,6-Trichlorophenol				
28 2,4,5-Trichlorophenol				
29 2-Chloronaphthalene				
30 2-Nitroaniline				

Ground Water Semivolatiles

SITE	SITE B	SITE B	SITE B	SITE B	SITE U	SITE U	SITE R	SITE R
SAMPLE NUMBER	DC-GW-40A	DC-GW-41	DC-GW-41A	DC-GW-42	DC-GW-43	DC-GW-43A	DC-GW-44	DC-GW-45
WELL NUMBER	EE-23	EE-24	EE-24	EE-24	EE-25	EE-25	P-1	B-28A
DATE SAMPLED	7-14-87	3-24-87	7-14-87	3-24-87	3-24-87	7-14-87	3-25-87	3-25-87
1 Phenol								
2 bis(2-Chloroethyl)ether								
3 2-Chlorophenol							4 J	8 J
4 1,3-Dichlorobenzene								
5 1,4-Dichlorobenzene							8 J	
6 Benzyl Alcohol								
7 1,2-Dichlorobenzene								
8 2-Methylphenol								
9 bis(2-Chloroisopropyl) ether								
10 4-Methylphenol								
11 N-Nitroso-n-Dipropylamine								
12 Hexachloroethane								
13 Nitrobenzene								
14 Isophorone								
15 2-Nitrophenol								
16 2,4-Dimethylphenol								
17 Benzoic Acid								
18 bis-(2-Chloroethoxy)methane								
19 2,4-Dichlorophenol								
20 1,2,4-Trichlorobenzene								
21 Naphthalene								
22 4-Chloroaniline								
23 Hexachlorobutadiene								
24 4-Chloro-3-methylphenol								
25 2-Methylnaphthalene								
26 Hexachlorocyclopentadiene								
27 2,4,6-Trichlorophenol								
28 2,4,5-Trichlorophenol								
29 2-Chloronaphthalene								
30 2-Nitroaniline								

SITE	SITE R	SITE R	SITE R	SITE R	SITE R	BLANK	PRIVATE	PRIVATE
SAMPLE NUMBER	DC-GW-46	DC-GW-47	DC-GW-48	DC-GW-49	DC-GW-50	DC-GW-51	DC-GW-52	DC-GW-53
WELL NUMBER	P-7	B-26A	B-26A	B-25A	P-11		WRIGHT	SETTLES
DATE SAMPLED	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-26-87	3-26-87
1 Phenol	25000 E			60000 E				
2 bis(2-Chloroethyl)ether								
3 2-Chlorophenol	2100	8 J	9 J	14000 E				
4 1,3-Dichlorobenzene								
5 1,4-Dichlorobenzene	550	4 J	3 J		54 J			
6 Benzyl Alcohol	750							
7 1,2-Dichlorobenzene	340	1 J	1 J	91 J				
8 2-Methylphenol								
9 bis(2-Chloroisopropyl) ether								
10 4-Methylphenol	120 J			6100				
11 N-Nitroso-n-Dipropylamine								
12 Hexachloroethane	850							
13 Nitrobenzene		35	29	420				
14 Isophorone								
15 2-Nitrophenol								
16 2,4-Dimethylphenol				160				
17 Benzoic Acid	270 J			6800				
18 bis-(2-Chloroethoxy)methane								
19 2,4-Dichlorophenol	5500			14000 E				
20 1,2,4-Trichlorobenzene								
21 Naphthalene	82 J							
22 4-Chloroaniline	25000 E	680	540		4100			
23 Hexachlorobutadiene								
24 4-Chloro-3-methylphenol								
25 2-Methylnaphthalene	200							
26 Hexachlorocyclopentadiene								
27 2,4,6-Trichlorophenol	2100			1500				
28 2,4,5-Trichlorophenol								
29 2-Chloronaphthalene								
30 2-Nitroaniline								

Ground Water Semivolatiles

SITE	SITE I	BLANK	SITE J	SITE G	SITE G	SITE G	SITE G	BLANK	SITE H	SITE L	SITE O	SITE O	SITE O	SITE O	SITE O
SAMPLE NUMBER	DC-GW-29 *	DC-GW-30 +	DC-GW-31	DC-GW-32	DC-GW-33	DC-GW-34	DC-GW-34A	DC-GW-35 +	DC-GW-36	DC-GW-37	DC-GW-38	DC-GW-38A	DC-GW-39	DC-GW-39A	DC-GW-40
WELL NUMBER	EE-12		EE-20	EE-11	EE-G106	EE-G102	EE-G102		EE-G110	EE-G109	EE-21	EE-21	EE-22	EE-22	EE-23
DATE SAMPLED	3-23-87	3-23-87	3-23-87	3-24-87	3-24-87	3-24-87	7-14-87	3-24-87	3-24-87	3-24-87	3-24-87	7-14-87	3-24-87	7-14-87	3-24-87
1 Phenol					2 J					150			500	1100	
2 bis(2-Chloroethyl)ether														91 J	
3 2-Chlorophenol				130	9 J					190			120	90 J	
4 1,3-Dichlorobenzene	110				4 J								320	290	
5 1,4-Dichlorobenzene	830			34 J	350								10000 E	15000 E	
6 Benzyl Alcohol															
7 1,2-Dichlorobenzene	110				6 J								7000	11000 E	
8 2-Methylphenol										6 J			70 J	120	
9 bis(2-Chloroisopropyl) ether															
10 4-Methylphenol				37 J						75			820	1100	
11 N-Nitroso-n-Dipropylamine															
12 Hexachloroethane															
13 Nitrobenzene															
14 Isophorone															
15 2-Nitrophenol										41					
16 2,4-Dimethylphenol				240									350	400	
17 Benzoic Acid															
18 bis-(2-Chloroethoxy)methane															
19 2,4-Dichlorophenol					11								30 J		
20 1,2,4-Trichlorobenzene					200								270	200	
21 Naphthalene				36 J									160	100	
22 4-Chloroaniline	70			15000 E	110				30	60			700		
23 Hexachlorobutadiene															
24 4-Chloro-3-methylphenol															
25 2-Methylnaphthalene													6 J		
26 Hexachlorocyclopentadiene															
27 2,4,6-Trichlorophenol					3 J										
28 2,4,5-Trichlorophenol															
29 2-Chloronaphthalene															
30 2-Nitroaniline															

Ground Water Semivolatiles

SITE	SITE G	SITE G	BLANK	SITE L	SITE G	SITE G	SITE G	BLANK	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I
SAMPLE NUMBER	DC-GW-15	DC-GW-16	DC-GW-17 *	DC-GW-18	DC-GW-19	DC-GW-20 #	DC-GW-21	DC-GW-22 *	DC-GW-23	DC-GW-24	DC-GW-25	DC-GW-26	DC-GW-27	DC-GW-28
WELL NUMBER	EE-6103	EE-6104		EE-6100	EE-6107	EE-6107	EE-05		EE-13	EE-12	EE-6112	EE-14	EE-15	EE 16
DATE SAMPLED	3-17-87	3-17-87	3-17-87	3-18-87	3-18-87	3-18-87	3-18-87	3-18-87	3-23-87	3-23-87	3-23-87	3-23-87	3-23-87	3 23 87
1 Phenol					6600	30000						1000		80
2 bis(2-Chloroethyl)ether														
3 2-Chlorophenol					690	1900				5 J		370		
4 1,3-Dichlorobenzene										110				
5 1,4-Dichlorobenzene					570	470 J				640		910	10	110
6 Benzyl Alcohol					5400	8600						230 J		350
7 1,2-Dichlorobenzene					200 J	100 J				110		220 J	4 J	15 J
8 2-Methylphenol					200 J	810						89 J		76
9 bis(2-Chloroisopropyl) ether														
10 4-Methylphenol					2200	9000						330		
11 N-Nitroso-n-Dipropylamine														
12 Hexachloroethane														
13 Nitrobenzene														
14 Isophorone														
15 2-Nitrophenol														
16 2,4-Dimethylphenol					1400	4300								
17 Benzoic Acid					35000 E	150000 E								
18 bis-(2-Chloroethoxy)methane					2400	7300				2 J		2900		
19 2,4-Dichlorophenol					400 J	450 J				22		1000		
20 1,2,4-Trichlorobenzene					1900	1700						2700		
21 Naphthalene		8 J			21000 E	18000						57 J		230
22 4-Chloroaniline										140	14	8300	18	9600 E
23 Hexachlorobutadiene														
24 4-Chloro-3-methylphenol												140 J		
25 2-Methylnaphthalene										1 J				9 J
26 Hexachlorocyclopentadiene														
27 2,4,6-Trichlorophenol						350						290		
28 2,4,5-Trichlorophenol														
29 2-Chloronaphthalene														
30 2-Nitroaniline														

Ground Water Pest/PCBs

SITE	SITE U	SITE U	SITE U	SITE U	SITE R	SITE R	SITE R	SITE R	SITE R	SITE R	SITE R	BLANK	PRIVATE	PRIVATE	PRIVATE	PRIVATE
SAMPLE NUMBER	DC-GW-41A	DC-GW-42	DC-GW-43	DC-GW-43A	DC-GW-44	DC-GW-45	DC-GW-46	DC-GW-47	DC-GW-48	DC-GW-49	DC-GW-50	DC-GW-51+	DC-GW-52	DC-GW-53	DC-GW-54	DC-GW-55
WELL NUMBER	EE-24	EE-24	EE-25	EE-25	P-1	B-20A	P-7	B-26A	B-26A	B-25A	P-11		WRIGHT	SETTLES	SCHMIDT	McDONALD
DATE SAMPLED	7-14-87	3-24-87	3-24-87	7-14-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-25-87	3-26-87	3-26-87	3-26-87	3-26-87
1 Alpha-BHC																
2 Beta-BHC																
3 Delta-BHC																
4 Gamma-BHC (Lindane)																
5 Heptachlor																
6 Aldrin																
7 Heptachlor Epoxide																
8 Edosulfan I																
9 Dieldrin																
10 4,4'-DDE																
11 Endrin																
12 Edosulfan II																
13 4,4'-DDD																
14 Endosulfan Sulfate																
15 4,4'-DDT																
16 Methoxychlor																
17 Endrin Ketone																
18 Chlordane																
19 Toxaphene																
20 AROCLOR-1016																
21 AROCLOR-1221																
22 AROCLOR-1232																
23 AROCLOR-1242																
24 AROCLOR-1248																
25 AROCLOR-1254																
26 AROCLOR-1260																

Ground Water Pest/PCBs

SITE	SITE I	SITE G	SITE G	SITE G	SITE G	BLANK	SITE N	SITE L	SITE D	SITE D	SITE D	SITE D	SITE D	SITE D	SITE D
SAMPLE NUMBER	BC-GW-31	BC-GW-32	BC-GW-33	BC-GW-34	BC-GW-34A	BC-GW-35 *	BC-GW-36	BC-GW-37	BC-GW-38	BC-GW-38A	BC-GW-39	BC-GW-39A	BC-GW-40	BC-GW-40A	BC-GW-41
WELL NUMBER	EE-20	EE-11	EE-6106	EE-6102	EE-6102		EE-6110	EE-6109	EE-21	EE-21	EE-22	EE-22	EE-23	EE-23	EE-24
DATE SAMPLED	3-23-87	3-24-87	3-24-87	3-24-87	7-14-87	3-24-87	3-24-87	3-24-87	3-24-87	7-14-87	3-24-87	7-14-87	3-24-87	7-14-87	3-24-87
1 Alpha-BHC			70 C												
2 Beta-BHC															
3 Delta-BHC															
4 Gamma-BHC (Lindane)															
5 Heptachlor															
6 Aldrin															
7 Heptachlor Epoxide															
8 Edosulfan I															
9 Dieldrin															
10 4,4'-DDE															
11 Endrin															
12 Edosulfan II															
13 4,4'-DDD															
14 Endosulfan Sulfate															
15 4,4'-DDT															
16 Methoxychlor															
17 Endrin Ketone															
18 Chlordane															
19 Toxaphene															
20 AROCLOR-1016															
21 AROCLOR-1221															
22 AROCLOR-1232															
23 AROCLOR-1242															
24 AROCLOR-1248															
25 AROCLOR-1254															
26 AROCLOR-1260															

Surface Soils Semivolatiles

SITE	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 6	SITE 8	SITE 8	SITE 8	SITE 6	SITE 8	SITE 6	SITE 6	SITE 6
SAMPLE NUMBER	DC-SS-29	DC-SS-30	DC-SS-31 D	DC-SS-32	DC-SS-33	DC-SS-34	DC-SS-35	DC-SS-36	DC-SS-37	DC-SS-38	DC-SS-39	DC-SS-40	DC-SS-41	DC-SS-42	DC-SS-43
LOCATION/GRID	A-5	B-5	D-5	C-5	D-5	E-5	F-5	G-5	H-5	A-6	B-6	C-6	D-6	F-6	B-7
DATE SAMPLED	11-11-86	11-11-86	11-11-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86
1 Phenol															
2 bis(2-Chloroethyl)ether															
3 2-Chlorophenol															
4 1,3-Dichlorobenzene															
5 1,4-Dichlorobenzene								240 J		2600 J					210 J
6 Benzyl Alcohol															
7 1,2-Dichlorobenzene															
8 2-Methylphenol															
9 bis(2-Chloroisopropyl) ether															
10 4-Methylphenol															
11 N-Nitroso-n-Dipropylamine															
12 Hexachloroethane															
13 Nitrobenzene															
14 Isophorone															
15 2-Nitrophenol															
16 2,4-Dimethylphenol															
17 Benzoic Acid															
18 bis-(2-Chloroethoxy)methane															
19 2,4-Dichlorophenol												6200			
20 1,2,4-Trichlorobenzene						33000		65 J	5300 J		1000 J				
21 Naphthalene								71 J	26000	110000		140 J		290 J	110 J
22 4-Chloroaniline															
23 Hexachlorobutadiene															
24 4-Chloro-3-methylphenol															
25 2-Methylnaphthalene								50 J		850 J					
26 Hexachlorocyclopentadiene															
27 2,4,6-Trichlorophenol												1500 J			
28 2,4,5-Trichlorophenol															
29 2-Chloronaphthalene															
30 2-Nitroaniline								1100 J	220000						

Surface Soils Semivolatiles

SITE	SITE 8	SITE 8	SITE 6	SITE 8	SITE 8	SITE 8	SITE 6	SITE 6	SITE 8	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6
SAMPLE NUMBER	BC-SS-15	BC-SS-16 B	BC-SS-17	BC-SS-18	BC-SS-19	BC-SS-20	BC-SS-21	BC-SS-22	BC-SS-23	BC-SS-24	BC-SS-25 B	BC-SS-26	BC-SS-27	BC-SS-28
LOCATION/GRID	B-3	B-3	H-3	A-4	B-4	C-4	D-4	E-4	F-4	G-4	G-4	H-4	I-4	J-4
DATE SAMPLED	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86
1 Phenol									78 J					
2 bis(2-Chloroethyl)ether														
3 2-Chlorophenol														
4 1,3-Dichlorobenzene														
5 1,4-Dichlorobenzene							2200000							
6 Benzyl Alcohol														
7 1,2-Dichlorobenzene									89 J					
8 2-Methylphenol														
9 bis(2-Chloroisopropyl) ether														
10 4-Methylphenol														
11 N-Nitroso-n-Dipropylamine														
12 Hexachloroethane														
13 Nitrobenzene														
14 Isophorone														
15 2-Nitrophenol														
16 2,4-Dimethylphenol														
17 Benzoic Acid														
18 bis-(2-Chloroethoxy)methane														
19 2,4-Dichlorophenol									120 J					
20 1,2,4-Trichlorobenzene			990 J						100 J				140 J	1800 J
21 Naphthalene			120000			1000 J			110 J					
22 4-Chloroaniline														
23 Hexachlorobutadiene														
24 4-Chloro-3-methylphenol														
25 2-Methylnaphthalene														
26 Hexachlorocyclopentadiene														
27 2,4,6-Trichlorophenol														
28 2,4,5-Trichlorophenol														
29 2-Chloronaphthalene														
30 2-Nitroaniline									1000 J					34000 J

Surface Soils Semivolatiles

SITE	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6
SAMPLE NUMBER	DC-SS-01	DC-SS-02	DC-SS-03	DC-SS-04	DC-SS-05	DC-SS-06	DC-SS-07	DC-SS-08	DC-SS-09	DC-SS-10	DC-SS-11	DC-SS-12	DC-SS-13	DC-SS-14
LOCATION/GRID	C-1	G-1	D-2	E-2	H-2	H-2	I-2	I-2	A-3	B-3	C-3	D-3	E-3	F-3
DATE SAMPLED	11-10-86	11-10-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86
1 Phenol														
2 bis(2-Chloroethyl)ether														
3 2-Chlorophenol														
4 1,3-Dichlorobenzene														
5 1,4-Dichlorobenzene														
6 Benzyl Alcohol														
7 1,2-Dichlorobenzene														
8 2-Methylphenol														
9 bis(2-Chloroisopropyl) ether														
10 4-Methylphenol														
11 N-Nitroso-n-Dipropylamine														
12 Hexachloroethane														
13 Nitrobenzene														
14 Isophorone														
15 2-Nitrophenol														
16 2,4-Dimethylphenol														
17 Benzoic Acid														
18 bis-(2-Chloroethoxy)methane														
19 2,4-Dichlorophenol														
20 1,2,4-Trichlorobenzene														
21 Naphthalene									810 J		14000			
22 4-Chloroaniline														
23 Hexachlorobutadiene														
24 4-Chloro-3-methylphenol														
25 2-Methylnaphthalene											1000 J			
26 Hexachlorocyclopentadiene														
27 2,4,6-Trichlorophenol														
28 2,4,5-Trichlorophenol														
29 2-Chloronaphthalene														
30 2-Nitroaniline														

Surface Soil Volatiles

SITE	SITE J	SITE J	SITE J
SAMPLE NUMBER	DC-SS-46	DC-SS-47	DC-SS-48I
LOCATION/GRID	SE	NE	NE
DATE SAMPLED	11-13-86	11-13-86	11-13-86
1 Chloromethane			
2 Bromomethane			
3 Vinyl Chloride			
4 Chloroethane			
5 Methylene Chloride	40 B	32 B	24 B
6 Acetone	10 BJ	33 B	12 BJ
7 Carbon Disulfide			
8 1,1-Dichloroethene			
9 1,1-Dichloroethane			
10 trans-1,2-Dichloroethene			
11 Chloroform			
12 1-2-Dichloroethane			
13 2-Butanone (MEK)	34 B	30 B	35 B
14 1,1,1-Trichloroethane			
15 Carbon Tetrachloride			
16 Vinyl Acetate			
17 Bromodichloromethane			
18 1,2-Dichloropropane			
19 trans-1,3-Dichloropropene			
20 Trichloroethene			
21 Dibromochloromethane			
22 1,1,2-Trichloroethane			
23 Benzene			
24 cis-1,3-Dichloropropene			
25 2-Chloroethyl Vinyl Ether			
26 Bromoform			
27 4-Methyl-2-pentanone			
28 2-Hexanone			
29 Tetrachloroethene			
30 1,1,2,2-Tetrachloroethane			
31 Toluene			
32 Chlorobenzene			
33 Ethylbenzene			
34 Styrene			
35 Total Xylenes			

Surface Soil Volatiles

	SITE	SITE G	SITE G	SITE G	SITE G	SITE G	SITE G	SITE G	SITE G	SITE G	SITE G	SITE G	SITE G	SITE G	BLANK	BLANK
	SAMPLE NUMBER	DC-SS-31	DC-SS-32	DC-SS-33	DC-SS-34	DC-SS-35	DC-SS-36	DC-SS-37	DC-SS-38	DC-SS-39	DC-SS-40	DC-SS-41	DC-SS-42	DC-SS-43	DC-SS-44*	DC-SS-45*
	LOCATION/GRID	D-5	C-5	B-5	E-5	F-5	G-5	H-5	A-6	B-6	C-6	D-6	F-6	B-7		
	DATE SAMPLED	11-11-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-13-86	11-11-86
1	Chloromethane															
2	Bromomethane															
3	Vinyl Chloride															
4	Chloroethane															
5	Methylene Chloride	90 B	35 B	230 B	46 B	23 B	55 B	69 B	40 B	63 B	40 B	37 B	60 B	29 B	52 B	65 B
6	Acetone	36 B	30 B	170 B	19 BJ		25 B	40 B	43 B	66 B	150 B	41 B	50 B	21 BJ	10 BJ	20 J
7	Carbon Disulfide															
8	1,1-Dichloroethene															
9	1,1-Dichloroethane															
10	trans-1,2-Dichloroethene															
11	Chloroform															
12	1-2-Dichloroethane															
13	2-Butanone (MEK)		43 B		37 B		40 B	34 B	35 B	59 B	46 B	37 B	39 B	40 B		
14	1,1,1-Trichloroethane															
15	Carbon Tetrachloride															
16	Vinyl Acetate															
17	Bromodichloromethane															
18	1,2-Dichloropropane															
19	trans-1,3-Dichloropropene															
20	Trichloroethene						11 J		19							
21	Dibromochloromethane															
22	1,1,2-Trichloroethane															
23	Benzene							2 J	80					4 J		
24	cis-1,3-Dichloropropene															
25	2-Chloroethyl Vinyl Ether															
26	Bromoform															
27	4-Methyl-2-pentanone	190	29 J	2000	60	100			140	12 J	31	34				
28	2-Hexanone	16 BJ		89 B												
29	Tetrachloroethene	21						12 J								
30	1,1,2,2-Tetrachloroethane															
31	Toluene				32				1400		33					
32	Chlorobenzene				10				60							
33	Ethylbenzene							55	140							
34	Styrene															
35	Total Xylenes							150	170							

Surface Soil Volatiles

SITE	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6
SAMPLE NUMBER	DC-SS-16	DC-SS-17	DC-SS-18	DC-SS-19	DC-SS-20	DC-SS-21	DC-SS-22	DC-SS-23	DC-SS-24	DC-SS-25	DC-SS-26	DC-SS-27	DC-SS-28	DC-SS-29	DC-SS-30
LOCATION/GRID	G-3	H-3	A-4	B-4	C-4	D-4	E-4	F-4	G-4	G-4	H-4	I-4	J-4	A-5	B-5
DATE SAMPLED	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86
1 Chloromethane															
2 Bromomethane															
3 Vinyl Chloride															
4 Chloroethane															
5 Methylene Chloride	56 D	90 D	36 D	81 D	73 D	160 D	62 D	50 D	71 D	79 D	60 D	63 D	63 D	80 D	62 D
6 Acetone	20 BJ	13 BJ	67 D	140 D	99 D	400 D		41	39 D	90	14 BJ	17 BJ	13 BJ	37 D	16 BJ
7 Carbon Disulfide															
8 1,1-Dichloroethene															
9 1,1-Dichloroethane															
10 trans-1,2-Dichloroethene															
11 Chloroform															
12 1-2-Dichloroethane															
13 2-Butanone (MEK)	46 D			100 D				42			40 D	46 D	36 D	36 D	
14 1,1,1-Trichloroethane															
15 Carbon Tetrachloride															
16 Vinyl Acetate															
17 Bromodichloromethane															
18 1,2-Dichloropropane															
19 trans-1,3-Dichloropropene															
20 Trichloroethene															
21 Dibromochloromethane															
22 1,1,2-Trichloroethane															
23 Benzene															
24 cis-1,3-Dichloropropene															
25 2-Chloroethyl Vinyl Ether															
26 Bromoform															
27 4-Methyl-2-pentanone			55	220 D	510 D	160	49 D		320	610					47
28 2-Hexanone				17 BJ	50 B	23 BJ	20 BJ	20 J	51 D						
29 Tetrachloroethene				13 J		40 J					12 J				
30 1,1,2,2-Tetrachloroethane															
31 Toluene										45	37				
32 Chlorobenzene															
33 Ethylbenzene															
34 Styrene															
35 Total Xylenes															

Surface Soil Volatiles

SITE	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6
SAMPLE NUMBER	BC-SS-01	BC-SS-02	BC-SS-03	BC-SS-04	BC-SS-05	BC-SS-06	BC-SS-07	BC-SS-08	BC-SS-09	BC-SS-10	BC-SS-11	BC-SS-12	BC-SS-13	BC-SS-14	BC-SS-15
LOCATION/GRID	C-1	B-1	D-2	E-2	H-2	H-2	I-2	I-2	A-3	B-3	C-3	D-3	E-3	F-3	G-3
DATE SAMPLED	11-10-86	11-10-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86
1 Chloromethane															
2 Bromomethane															
3 Vinyl Chloride															
4 Chloroethane															
5 Methylene Chloride	34 B	32 B	33 B	35 B	42 B	63 B	61 B	27 B	51 B	59 B	59 B	105 B	43 B	95 B	26 B
6 Acetone	20 BJ	23 BJ	25 BJ		40 B	41 B	25 JB		55 B		37 B	27 BJ	32 B		10 B
7 Carbon Disulfide															
8 1,1-Dichloroethene															
9 1,1-Dichloroethane															
10 trans-1,2-Dichloroethene															
11 Chloroform															
12 1-2-Dichloroethane															
13 2-Butanone (MEK)		43 B			51 B		51 B	37 B	57 B				42 B	61 B	16 B
14 1,1,1-Trichloroethane															
15 Carbon Tetrachloride															
16 Vinyl Acetate															
17 Bromodichloromethane															
18 1,2-Dichloropropane															
19 trans-1,3-Dichloropropene															
20 Trichloroethene															
21 Dibromochloromethane															
22 1,1,2-Trichloroethane															
23 Benzene															
24 cis-1,3-Dichloropropene															
25 2-Chloroethyl Vinyl Ether															
26 Bromoform															
27 4-Methyl-2-pentanone									9 J	8 J	16 J	200			14 J
28 2-Hexanone														22 B	
29 Tetrachloroethene									22	11 J	63	50		24	
30 1,1,2,2-Tetrachloroethane															
31 Toluene								10 B			36 B		30 B		12
32 Chlorobenzene															
33 Ethylbenzene															
34 Styrene															
35 Total Xylenes															

Sedim. Inorganic

SITE	CS-D	BLANK	BLANK	CS-A	CS-A	CS-A	CS-A	CS-A
SAMPLE NUMBER	BC-SD-20	BC-SD-29 +	BC-SD-31 +	BC-SD-32	BC-SD-33 B	BC-SD-34 B	BC-SD-35	BC-SD-36
SAMPLE DEPTH	1.5'-2'			1.5'-2'	0-6"	0-6"	0-6"	1.5'-2'
DATE SAMPLED	11-5-86	11-5-86	11-6-86	11-6-86	11-6-86	11-6-86	11-6-86	11-6-86
1 Aluminum	5070	11000	10500	8570	6720	8310	7210	9100
2 Antimony								
3 Arsenic	5.1 R	5.6 R	5.2 R	18 R	30 R	76 R	21 R	12 R
4 Barium	199	362	277	430	207	207	732	320
5 Beryllium								
6 Boron								
7 Cadmium	5.6	2.5	2.1	18	25	22	31	17
8 Chromium, trivalent	13	15	13	34	102	121	206	75
9 Cobalt	6.4	5.8	5.4	8.9	3.2		27	11
10 Copper	247 B	35 B	31 B	2620 B	4630 B	3130 B	11400 B	10300 B
11 Iron	15000	16600	15700	25000	37400	36100	36600	21900
12 Lead	44	47	30	225	1900	2030	1600	910
13 Manganese	191	412	304	123	69	66	296	153
14 Mercury	0.18			2.81	4.06	5.62	3	1.18
15 Nickel	236 RB	18 RB	19 RB	763 RB	310 RB	255 RB	559 RB	307 RB
16 Selenium					3.3		3	
17 Silver				6	26	23	33	13
18 Thallium								
19 Tin				14	76	412	57	
20 Vanadium	17	27	24	24	20	23	25	22
21 Zinc	917	197	172	1590	1510	1230	3420	2740
22 Cyanide								

Sediment Inorganic

SITE	CS-B	CS-B	SITE H	SITE H	SITE H	CS-B	CS-B	CS-B	CS-C	CS-C	CS-C	CS-C	CS-B	CS-B	CS-B
SAMPLE NUMBER	BC-SD-13 B	BC-SD-14	BC-SD-15	BC-SD-16	BC-SD-17	BC-SD-18 B	BC-SD-19	BC-SD-20	BC-SD-21	BC-SD-22	BC-SD-23	BC-SD-24	BC-SD-25	BC-SD-26	BC-SD-27
SAMPLE DEPTH	0-6"	2'-3'	0-6"	0-6"	0-6"	0-6"	0-6"	1.5'-2'	0-6"	2'-2.5'	0-6"	2'-2.5'	0-6"	1.5'-2'	0-6"
DATE SAMPLED	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86
1 Aluminum	4800	6300	6560	2430	7510	5300	9750	12900	12600	7530	8450	12600	11250	12500	6400
2 Antimony															
3 Arsenic	14 R	20 R	3.6 R	12 R	16 R	16 R	21	13 R	5.1 R	9 R	33 R	30 R	3.2 R	7.8 B	4.7 R
4 Barium	410	1880	156	131	196	467	17300	3120	376	570	1700	1010	239	622	214
5 Beryllium															
6 Boron															
7 Cadmium	22	36	1.5	11	8	24	30	8.2	17	34	27	42	12	42	23
8 Chromium, trivalent	62	153	15	37	53	79	110	113	81	60	54	68	33	48	34
9 Cobalt	6.6	9.2	7.7	7.2	5	6	11	6.9	7.5	10	6.6	7.2	5	12	
10 Copper	8740 B	6700 B	167 B	1270 B	1780 B	8640 B	15300 B	2610 B	580 B	5910 B	6640 B	2440 B	379 B	1630 B	1320 B
11 Iron	16400	19500	11100	26600	14400	16300	58200	21300	18400	18000	35000	50900	22800	40200	313[illegible]
12 Lead	853	931	26	65	71	903	1460	330	467	593	975	661	146	489	3[illegible]9
13 Manganese	197	153	100	97	139	218	82	70	177	98	161	151	190	273	178
14 Mercury	0.73	1.3	0.13	0.56	8	0.9	1.68	0.89	6.71	0.95	1.69	2.81	1	0.89	0.34
15 Nickel	56 RB	502 RB	356 RB	250 RB	309 RB	82	1520 RB	867 RB	116 RB	836 RB	1290 RB	788 RB	174 RB	665 RB	537 RB
16 Selenium	3.3	4.1				4	2					2.5			
17 Silver	10	11				14	15								
18 Thallium							4								
19 Tin	32	28		23			16								
20 Vanadium	23	27	19		19	24	48	25	32	22	27	36	37	32	
21 Zinc	3310	6650	860	872	1010	3410	11900	6610	1370	15600	6800	6430	1010	6590	2300
22 Cyanide		3.8													

Sediment Pest/PCBs

SITE	CS-B	BLANK	BLANK	CS-A	CS-A	CS-A	CS-A	CS-A
SAMPLE NUMBER	DC-SD-20	DC-SD-29 +	DC-SD-31 +	DC-SD-32	DC-SD-33 #	DC-SD-34 #	DC-SD-35	DC-SD-36
SAMPLE DEPTH	1.5'-2'			1.5'-2'	0-6"	0-6"	0-6"	1.5'-2'
DATE SAMPLED	11-5-86	11-5-86	11-6-86	11-6-86	11-6-86	11-6-86	11-6-86	11-6-86
1 Alpha-BHC								
2 Beta-BHC								
3 Delta-BHC								
4 Gamma-BHC (Lindane)								
5 Heptachlor								
6 Aldrin								
7 Heptachlor Epoxide								
8 Edosulfan I								
9 Dieldrin								
10 4,4'-DDE								
11 Endrin								
12 Edosulfan II								
13 4,4'-DDD								
14 Endosulfan Sulfate								
15 4,4'-DDT								
16 Methoxychlor								
17 Endrin Ketone								
18 Chlordane								
19 Toxaphene								
20 AROCLOR-1016								
21 AROCLOR-1221								
22 AROCLOR-1232								
23 AROCLOR-1242								
24 AROCLOR-1248				21000 C	7900	11000		
25 AROCLOR-1254	1900			13000 JC	6500	10600	71000 C	30000
26 AROCLOR-1260					2000 J	2200 J	24000 C	13000 J

Sediment Pest/PCBs

SITE	CS-B	CS-B	SITE H	SITE H	SITE H	CS-B	CS-B	CS-B	CS-C	CS-C	CS-C	CS-C	CS-B	CS-B	CS-B
SAMPLE NUMBER	BC-SD-13 B	BC-SD-14	BC-SD-15	BC-SD-16	BC-SD-17	BC-SD-18 B	BC-SD-19	BC-SD-20	BC-SD-21	BC-SD-22	BC-SD-23	BC-SD-24	BC-SD-25	BC-SD-26	BC-SD-27
SAMPLE DEPTH	0-6"	2'-3'	0-6"	0-6"	0-6"	0-6"	0-6"	1.5'-2'	0-6"	2'-2.5'	0-6"	2'-2.5'	0-6"	1.5'-2'	0-6"
DATE SAMPLED	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86
1 Alpha-BHC															
2 Beta-BHC															
3 Delta-BHC															
4 Gamma-BHC (Lindane)															
5 Heptachlor															
6 Aldrin															
7 Heptachlor Epoxide															
8 Edosulfan I															
9 Dieldrin															
10 4,4'-DDE															
11 Endrin													500		
12 Edosulfan II															
13 4,4'-DDD															
14 Endosulfan Sulfate															
15 4,4'-DDT															
16 Methoxychlor															
17 Endrin Ketone															
18 Chlordane															
19 Toxaphene															
20 AROCLOR-1016															
21 AROCLOR-1221															
22 AROCLOR-1232															
23 AROCLOR-1242				20000											
24 AROCLOR-1248		400000 C	660	8030	5200					8700					
25 AROCLOR-1254			670		4200		145000 C	16000 C		9300	11000	1600 J			7500
26 AROCLOR-1260	10300 J	66000 C	430 J		2700 J	7700	54000 JC	5600 JC		5000 J	7800 J				4500

Sediment Semivolatiles

SITE	CS-B	CS-B	BLANK	BLANK	CS-A	CS-A	CS-A	CS-A	CS-A
SAMPLE NUMBER	BC-SD-27	BC-SD-28	BC-SD-29 +	BC-SD-31 +	BC-SD-32	BC-SD-33 #	BC-SD-34 #	BC-SD-35	BC-SD-36
SAMPLE DEPTH	0-6"	1.5'-2'			1.5'-2'	0-6"	0-6"	0-6"	1.5'-2'
DATE SAMPLED	11-5-86	11-5-86	11-5-86	11-6-86	11-6-86	11-6-86	11-6-86	11-6-86	11-6-86
1 Dimethyl Phthalate									
2 Acenaphtylene									
3 3-Nitroaniline									
4 Acenaphthene									170 J
5 2,4-Dinitrophenol									
6 4-Nitrophenol									
7 Dibenzofuran									
8 2,4-Dinitrotoluene									
9 2,6-Dinitrotoluene									
10 Diethylphthalate									
11 4-Chlorophenyl-Phenylether									
12 Fluorene									
13 4-Nitroaniline									
14 4,6-Dinitro-2-methylphenol									
15 N-Nitrosodiphenylamine					220 J				
16 4-Bromophenyl-phenylether									
17 Hexachlorobenzene					110 J			1100 J	
18 Pentachlorophenol								800 J	
19 Phenanthrene					190 J				
20 Anthracene									
21 Di-n-butyl phthalate									900 J
22 Fluoranthene								600 J	
23 Pyrene					110 J			1000 J	1400 J
24 Butyl Benzyl phthalate					520		2400 J		
25 3,3'-Dichlorobenzidine									
26 Benzo(a)Anthracene									
27 bis(2-ethylhexyl) phthalate					200 J	2200 J	2900	130 J	
28 Chrysene					110 J		710 J	1000 J	1700 J
29 Di-n-octyl phthalate	170 J				300 J	420 J	2900	8100	11000
30 Benzo(b)Fluoranthene	500 J						330 J	760 J	1000 J
31 Benzo(k)Fluoranthene									
32 Benzo(a)Pyrene	240 J							430 J	540 J
33 Indeno(1,2,3-cd)Pyrene	310 J							570 J	
34 Benzo(g,h,i)Perylene									
35 Dibenz(a,h)Anthracene	360 J							960 J	

Sediment Semivolatiles

SITE	CS-D	CS-D	SITE H	SITE H	SITE H	CB-D	CB-D	CB-D	CS C	CS C	CB C	CS C	CS D	CS-D
SAMPLE NUMBER	BC-SD-13_0	BC-SD-14	BC-SD-15	BC-SD-16	BC-SD-17	BC-SD-18 0	BC-SD-19	BC-SD-20	BC-SD-21	BC-SD-22	BC-SD-23	BC-SD-24	BC-SD-25	BC-SD-26
SAMPLE DEPTH	0-6"	2'-3'	0-6"	0-6"	0-6"	0-6"	0-6"	1.5'-2'	0-6"	2'-2.5'	0-6"	2'-2.5'	0-6"	1.5'-2'
DATE SAMPLED	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86
1 Dimethyl Phthalate														
2 Acenaphtylene														
3 3-Nitroaniline														
4 Acenaphthene										130 J				
5 2,4-Dinitrophenol														
6 4-Nitrophenol		2600 J												
7 Dibenzofuran														
8 2,4-Dinitrotoluene														
9 2,6-Dinitrotoluene														
10 Diethylphthalate														
11 4-Chlorophenyl-Phenylether														
12 Fluorene		3900 J								370 J				
13 4-Nitroaniline														
14 4,6-Dinitro-2-methylphenol														
15 N-Nitrosodiphenylamine														
16 4-Bromophenyl-phenylether														
17 Hexachlorobenzene							1900	210 J						
18 Pentachlorophenol							900 J	370 J						
19 Phenanthrene		15000 J							200 J	810 J		220 J		
20 Anthracene										500 J				
21 Di-n-butyl phthalate			500 B	570 BJ	560 J	300 J		200 J				120 J	130 J	79 J
22 Fluoranthene		11000 J								4600		370 J		130 J
23 Pyrene		13000 J				1400 J		91 J	440 J	4500		290 J		120 J
24 Butyl Benzyl phthalate						830 J								
25 3,3'-Dichlorobenzidine														
26 Benzo(a)Anthracene						430 J			300 J	3300	650 J	230 J		
27 bis(2-ethylhexyl) phthalate	9900 J	9500 J		540 J	150 J	5300		95 J	740 J		660 J			72 J
28 Chrysene						1200 J		100 J	550 J	4400	1000	300 J		83 J
29 Di-n-octyl phthalate		2600 J	120 J	270 J		940 J		96 J		190 J				
30 Benzo(b)Fluoranthene		3400 J					2000			7500	2000	1000		200 J
31 Benzo(k)Fluoranthene	720 J					1500 J		410 J	920	660 J				
32 Benzo(a)Pyrene	1100 J	1000 J				490 J	310 J	95 J	400 J	4500	940	350 J		86 J
33 Indeno(1,2,3-cd)Pyrene						850 J	1400 J	200 J	590 J	4300	1700	530 J		100 J
34 Benzo(g,h,i)Perylene							390 J			1500 J	640 J	110 J		
35 Dibenz(a,h)Anthracene						1400 J	1800	210 J	550 J	6000	1700	470 J		91 J

Sediment Semivolatiles

SITE	CS-B	CS-B	BLANK	BLANK	CS-A	CS-A	CS-A	CS-A	CS-A
SAMPLE NUMBER	DC-SD-23	DC-SD-28	DC-SD-29	DC-SD-31	DC-SD-32	DC-SD-33	DC-SD-34	DC-SD-35	DC-SD-36
SAMPLE DEPTH	0-6"	1.5'-2'			1.5'-2'	0-6"	0-6"	0-6"	1.5'-2'
DATE SAMPLED	11-5-86	11-5-86	11-5-86	11-6-86	11-6-86	11-6-86	11-6-86	11-6-86	11-6-86
1 Phenol									
2 bis(2-Chloroethyl)ether									
3 2-Chlorophenol									
4 1,3-Dichlorobenzene					160 J				550 J
5 1,4-Dichlorobenzene					1000		410 J	130 J	2900
6 Benzyl Alcohol									
7 1,2-Dichlorobenzene					400	270 J			
8 2-Methylphenol									
9 bis(2-Chloroisopropyl) ether									
10 4-Methylphenol									
11 N-Nitroso-n-Dipropylamine									
12 Hexachloroethane									
13 Nitrobenzene									
14 Isophorone									
15 2-Nitrophenol									
16 2,4-Dimethylphenol									
17 Benzoic Acid									
18 bis-(2-Chloroethoxy)methane									
19 2,4-Dichlorophenol									
20 1,2,4-Trichlorobenzene					500			90 J	1500 J
21 Naphthalene								130 J	
22 4-Chloroaniline								1000 J	
23 Hexachlorobutadiene									
24 4-Chloro-3-methylphenol									
25 2-Methylnaphthalene							450 J		
26 Hexachlorocyclopentadiene									
27 2,4,6-Trichlorophenol									
28 2,4,5-Trichlorophenol									
29 2-Chloronaphthalene									
30 2-Nitroaniline									

Sediment Semivolatiles

SITE	CS-B	CS-B	SITE H	SITE H	SITE H	CS-B	CS-B	CS-B	CS-C	CS-C	CS-C	CS-C	CS-D	CS-D
SAMPLE NUMBER	BC-SD-13	BC-SD-14	BC-SD-15	BC-SD-16	BC-SD-17	BC-SD-18	BC-SD-19	BC-SD-20	BC-SD-21	BC-SD-22	BC-SD-23	BC-SD-24	BC-SD-25	BC-SD-26
SAMPLE DEPTH	0-6"	2'-3'	0-6"	0-6"	0-6"	0-6"	0-6"	1.5'-2'	0-6"	2'-2.5'	0-6"	2'-2.5'	0-6"	1.5'-2'
DATE SAMPLED	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86
1 Phenol											500 J	81 J		
2 bis(2-Chloroethyl)ether														
3 2-Chlorophenol														
4 1,3-Dichlorobenzene										110 J				
5 1,4-Dichlorobenzene		220000					130 J			690 J				
6 Benzyl Alcohol														
7 1,2-Dichlorobenzene		17000 J												
8 2-Methylphenol														
9 bis(2-Chloroisopropyl) ether														
10 4-Methylphenol														
11 N-Nitroso-n-Dipropylamine														
12 Hexachloroethane														
13 Nitrobenzene														
14 Isophorone														
15 2-Nitrophenol														
16 2,4-Dimethylphenol														
17 Benzoic Acid														
18 bis-(2-Chloroethoxy)methane														
19 2,4-Dichlorophenol														
20 1,2,4-Trichlorobenzene		5400 J					390 J	76 J		260 J	130 J	64 J		
21 Naphthalene	400 J	9500 J				190 J	120 J			330 J	160 J			
22 4-Chloroaniline														
23 Hexachlorobutadiene														
24 4-Chloro-3-methylphenol														
25 2-Methylnaphthalene		8400 J								100 J				
26 Hexachlorocyclopentadiene														
27 2,4,6-Trichlorophenol														
28 2,4,5-Trichlorophenol														
29 2-Chloronaphthalene														
30 2-Nitroaniline														

Sediment Volatiles

SITE	CS-B	BLANK	BLANK	CS-A	CS-A	CS-A	CS-A	CS-A
SAMPLE NUMBER	BC-SD-20	BC-SD-29 +	BC-SD-31 +	BC-SD-32	BC-SD-33 #	BC-SD-34 #	BC-SD-35	BC-SD-36
SAMPLE DEPTH	1.5'-2'			1.5'-2'	0-6"	0-6"	0-6"	1.5'-2'
DATE SAMPLED	11-5-86	11-5-86	11-6-86	11-6-86	11-6-86	11-6-86	11-6-86	11-6-86
1 Chloromethane								
2 Bromomethane								
3 Vinyl Chloride								
4 Chloroethane								
5 Methylene Chloride	20000 B	15000 B	14000 B	14000 B	6300 B	6600 B	8000 B	7200 B
6 Acetone	7400 B	6200 B	4700 B	11000 B	12000 B	5300 B	23000 B	6800 B
7 Carbon Bisulfide								
8 1,1-Dichloroethene								
9 1,1-Dichloroethane								
10 trans-1,2-Dichloroethene								
11 Chloroform								
12 1-2-Dichloroethane								
13 2-Butanone (MEK)	15000 B	11000 B	5400 B	12000 B	11000 B	9200 B		12000 B
14 1,1,1-Trichloroethane								
15 Carbon Tetrachloride								
16 Vinyl Acetate								
17 Bromodichloromethane								
18 1,2-Dichloropropane								
19 trans-1,3-Dichloropropene								
20 Trichloroethene								
21 Dibromochloromethane								
22 1,1,2-Trichloroethane								
23 Benzene								
24 cis-1,3-Dichloropropene								
25 2-Chloroethyl Vinyl Ether								
26 Bromoform								
27 4-Methyl-2-pentanone								
28 2-Hexanone						930 JB		
29 Tetrachloroethene								
30 1,1,2,2-Tetrachloroethane								
31 Toluene								
32 Chlorobenzene								400 J
33 Ethylbenzene								
34 Styrene								
35 Total Xylenes								

Subsurface Soils Volatiles

SITE
SAMPLE NUMBER
SAMPLE DEPTH
DATE SAMPLED
1 Chloromethane
2 Bromomethane
3 Vinyl Chloride
4 Chloroethane
5 Methylene Chloride
6 Acetone
7 Carbon Disulfide
8 1,1-Dichloroethene
9 1,1-Dichloroethane
10 trans-1,2-Dichloroethene
11 Chloroform
12 1-2-Dichloroethane
13 2-Butanone (MEK)
14 1,1,1-Trichloroethane
15 Carbon Tetrachloride
16 Vinyl Acetate
17 Bromodichloromethane
18 1,2-Dichloropropane
19 trans-1,3-Dichloropropene
20 Trichloroethene
21 Dibromochloromethane
22 1,1,2-Trichloroethane
23 Benzene
24 cis-1,3-Dichloropropene
25 2-Chloroethyl Vinyl Ether
26 Bromoform
27 4-Methyl-2-pentanone
28 2-Hexanone
29 Tetrachloroethene
30 1,1,2,2-Tetrachloroethane
31 Toluene
32 Chlorobenzene
33 Ethylbenzene
34 Styrene
35 Total Xylenes

Subsurface Soils Volatiles

SITE	SITE P	SITE P	SITE P	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	BLANK	SITE B	SITE B	SITE B	SITE B	SITE B
SAMPLE NUMBER	BC-P2-54	BC-P5-55	BC-P5-56 B	BC-01-59	BC-02-60	BC-03-61	BC-04-62	BC-05-63	BC-05-64 B	BC-00-65 •	BC-06-66	BC-09-72	BC-09-73	BC-010-74	BC-010-75
SAMPLE DEPTH	25'-35'	10'-25	10'-25'	15'-25'	20'-30'	10'-20'	0-10'	8.5'-20'	8.5'-20'		15'-25'	0-10'	15'-20'	5'-10'	10'-15'
DATE SAMPLED	2-11-87	2-12-87	2-12-87	2-16-87	2-17-87	2-17-87	2-17-87	2-17-87	2-17-87	2-18-87	2-18-87	2-26-67	2-26-87	2-26-87	[illegible]
1 Chloromethane															
2 Bromomethane															
3 Vinyl Chloride															
4 Chloroethane															
5 Methylene Chloride	5 BJ	2 BJ	5 BJ		35	10 J	833 BJ		10 J	139 B	4 J	870 BJ	519 BJ	7[illegible] BJ	341 BJ
6 Acetone	1036 BE	333 BE	413 BE	1379 BE	9103 BE	4405 BE	7692 B	8659 BE	11463 BE		457 B		[illegible] B	5046 B	2514 B
7 Carbon Disulfide															
8 1,1-Dichloroethene															
9 1,1-Dichloroethane					10 J										
10 trans-1,2-Dichloroethene					192	6 J									
11 Chloroform															
12 1-2-Dichloroethane					23										
13 2-Butanone (MEK)	76 B	22 B	26 B	30 B	23641 BE	36 B	7179 B	244 B	171 B		20 B		4444 B	7436 B	670[illegible] B
14 1,1,1-Trichloroethane							1410								
15 Carbon Tetrachloride															
16 Vinyl Acetate															
17 Bromodichloromethane															
18 1,2-Dichloropropane															
19 trans-1,3-Dichloropropene															
20 Trichloroethene					69										
21 Dibromochloromethane															
22 1,1,2-Trichloroethane															
23 Benzene					667	24	30769		18 J					1795	
24 cis-1,3-Dichloropropene															
25 2-Chloroethyl Vinyl Ether															
26 Bromoform															
27 4-Methyl-2-pentanone	29 B				1244 B		7692								
28 2-Hexanone	2 BJ				63										
29 Tetrachloroethene															
30 1,1,2,2-Tetrachloroethane					20										
31 Toluene							29407					293 J		4339	
32 Chlorobenzene					1667	62	30462	74	159			841 J		50974	1259
33 Ethylbenzene					46	167	166667 E	37 J	57 J			2439	74 J	9103	341 J
34 Styrene															
35 Total Xylenes					141	976	615305 E	244	256			21951	23[illegible] J	29407	1114 J

Subsurface Soils Volatiles

SITE	SITE J	SITE J	SITE K	SITE K	SITE K	BLANK	SITE L	SITE L	SITE L	SITE L	SITE L	SITE M	SITE M	BLANK	SITE P
SAMPLE NUMBER	BC-J2-12	BC-J3-13	BC-K1-08	BC-K2-25	BC-K3-32	BC-LB-01 +	BC-L1-02	BC-L2-03	BC-L3-04	BC-L4-09	BC-L4-10 +	BC-M1-05	BC-M2-06	BC-MB-07 +	BC-P1-53
SAMPLE DEPTH	15'-25'	0-10'	0-10'	0-10'	10'-20'		5'-10'	5'-15'	5'-15'	10'-20'	10'-20'	0-10'	5'-15'		0-10'
DATE SAMPLED	12-17-86	12-17-86	12-16-87	1-12-87	1-22-87	12-12-86	12-12-86	12-12-86	12-12-86	12-17-86	12-17-86	12-15-86	12-15-86	12-16-86	2-1? -87
1 Chloromethane															
2 Bromomethane															
3 Vinyl Chloride															
4 Chloroethane															
5 Methylene Chloride	372 BJ	3 BJ	6 B	13 B	9 B	17 B	14 B	141 B	2270 B	8	5 J	4 BJ	6 J	4 BJ	10 B
6 Acetone	4407 B	467 BE	212 B	44 B	1003 EB	32 B	907 B	449 B	4557 B	32 B	81 B	45 B	11 BJ	23 B	1025 EE
7 Carbon Disulfide															
8 1,1-Dichloroethene															
9 1,1-Dichloroethane															
10 trans-1,2-Dichloroethene															
11 Chloroform									20253	96	49				[illegible]
12 1-2-Dichloroethane															
13 2-Butanone (MEK)	6026 B		25 B	29 B	29 B		16		10000 B	16 B			14 J		100 B
14 1,1,1-Trichloroethane															
15 Carbon Tetrachloride															
16 Vinyl Acetate															
17 Bromodichloromethane															
18 1,2-Dichloropropane															
19 trans-1,3-Dichloropropene															
20 Trichloroethene															
21 Dibromochloromethane															
22 1,1,2-Trichloroethane															
23 Benzene								141	4177	7 J	4 J				49
24 cis-1,3-Dichloropropene															
25 2-Chloroethyl Vinyl Ether															
26 Bromoform															
27 4-Methyl-2-pentanone		4 J	11 J				8 J	167		68 B	49 B	4 J			49
28 2-Hexanone															38
29 Tetrachloroethene															
30 1,1,2,2-Tetrachloroethane															
31 Toluene			15					2179	26502	93	50				413
32 Chlorobenzene															170
33 Ethylbenzene	2051							40 J							119
34 Styrene															
35 Total Xylenes	7949							179	670 J						450

Subsurface Soils Volatiles

SITE	SITE I	SITE I	SITE I	BLANK	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE J
SAMPLE NUMBER	DC-15-41	DC-15-42	DC-16-43	DC-18-44	DC-17-45	DC-17-46	DC-17-47	DC-19-48	DC-19-49	DC-110-50	DC-111-51	DC-111-52	DC-112-57	DC-112-58	DC-J1-11
SAMPLE DEPTH	5'-27.5'	20'-30'	10'-25'		3.5'-12.5'	13'-23'	13'-23'	6'-23'	26'-30'	15'-30'	6'-20'	26'-39'	3.5'-12.5'	10.5'-27.5'	13'-20'
DATE SAMPLED	1-30-87	1-30-87	2-2-87	2-3-87	2-3-87	2-3-87	2-3-87	2-4-87	2-4-87	2-4-87	2-5-87	2-5-87	2-13-87	2-13-87	12-17-86
1 Chloromethane															
2 Bromomethane															
3 Vinyl Chloride															
4 Chloroethane															
5 Methylene Chloride	5207 D	5310 D	1047 DJ	6 B	7 B	15 B	13 D	1117 DJ	418 DJ	636 DJ	852 DJ	46 D	17 D	17 D	5 DJ
6 Acetone	10541 D	6726 D	13390 D	10 JB	1950 ED	850 ED	914 ED	13377 D	5289 D	6400 D	13861 D	708 B	1461 BE	549 BE	562 BE
7 Carbon Disulfide															
8 1,1-Dichloroethene															
9 1,1-Dichloroethane															
10 trans-1,2-Dichloroethene					3 J										
11 Chloroform															
12 1-2-Dichloroethane															
13 2-Butanone (MEK)	13970 D	9794 D	9702 D	18	30		23	10731 D	4059 D	8640 D	14696 D	168 D	12 D	27 D	22 D
14 1,1,1-Trichloroethane										432 J					
15 Carbon Tetrachloride															
16 Vinyl Acetate															
17 Bromodichloromethane															
18 1,2-Dichloropropane															
19 trans-1,3-Dichloropropene															
20 Trichloroethene	3810									640 J					
21 Dibromochloromethane															
22 1,1,2-Trichloroethane															
23 Benzene	24130	637 J	2156					1000 J	107 J	1000 J	3340	23 J			
24 cis-1,3-Dichloropropene															
25 2-Chloroethyl Vinyl Ether															
26 Bromoform															
27 4-Methyl-2-pentanone			4150											1 BJ	
28 2-Hexanone															
29 Tetrachloroethene	2667	2950								612 J					
30 1,1,2,2-Tetrachloroethane															
31 Toluene	24130 B	1652 JB	5907					77910	1553 D	3120	1037	40			
32 Chlorobenzene	45720	14160	7854		10			3234	935	2640	100550	2040			
33 Ethylbenzene	9779	3068	5002					500 J	203 J	8160	1035 J	96			
34 Styrene															
35 Total Xylenes	11049	1652 J	4150					867 J	102 J	2760	1620 J	86			

Subsurface Soils Volatiles

SITE	SITE N	SITE N	SITE N	SITE N	SITE N	SITE N	BLANK	SITE N	SITE N	SITE N	SITE N	SITE N	SITE I	SITE I	SITE I
SAMPLE NUMBER	BC-H1-14	BC-H1-15	BC-H2-16	BC-H3-17	BC-H3-18 +	BC-H4-19	BC-HB-20 +	BC-H5-21	BC-H6-22	BC-H7-23	BC-H8-24	BC-H9-28	BC-11-38	BC-12-39	BC-13-40
SAMPLE DEPTH	15'-25'	35'-50'	5'-20'	10'-20'	10'-20'	10'-25'		0-10'	35'-50'	35'-50'	5'-15'	15'-25'	0-10'	5'-25'	5'-15'
DATE SAMPLED	12-10-06	12-10-07	1-5-07	1-6-07	1-6-07	1-6-07	1-7-07 66	1-7-07	1-8-07	1-8-07	1-9-07	1-13-07	1-27-67	1-28-67	1-29-87
1 Chloromethane															
2 Bromomethane															
3 Vinyl Chloride															
4 Chloroethane															
5 Methylene Chloride	710 BJ	13 J	13137 D	52 D	38 D	55600 D	59 D	39 D	32 D	38 B	38 D	6 BJ	74? BJ	2160 B	6768 B
6 Acetone	7099 D	30 D	21140 D	461 D	1135 DE	10670 D	49 D	15 BJ	2035 DE	319 D	754 DE	1524 DE	2192 BJ	11340 D	16920 B
7 Carbon Disulfide															
8 1,1-Dichloroethene															
9 1,1-Dichloroethane															
10 trans-1,2-Dichloroethene															
11 Chloroform				192	53										
12 1-2-Dichloroethane				12 J											
13 2-Butanone (MEK)	10960 D		27100 D			25020 D				33		36 D	3562 D	10550 D	16920 D
14 1,1,1-Trichloroethane															1692
15 Carbon Tetrachloride															
16 Vinyl Acetate															
17 Bromodichloromethane															
18 1,2-Dichloropropane															
19 trans-1,3-Dichloropropene															
20 Trichloroethene				10 J											
21 Dibromochloromethane															
22 1,1,2-Trichloroethane															
23 Benzene	61290	4 J	22650	256	71	22240			19				397 J	5265	
24 cis-1,3-Dichloropropene															
25 2-Chloroethyl Vinyl Ether															
26 Bromoform															
27 4-Methyl-2-pentanone			7052 J	909 E	554		14 J		9 J						
28 2-Hexanone															
29 Tetrachloroethene	5645													5265	1?14 J
30 1,1,2,2-Tetrachloroethane															
31 Toluene	25806		11174	486	105	76450							650 J	7425	677 BJ
32 Chlorobenzene	451613 E	24	120000	307	77	12700							90420 E	13500	126900
33 Ethylbenzene	10000		4379 J			12700							15070	3375	
34 Styrene															
35 Total Xylenes	19355		1510 J			23630							19180	8100	

Subsurface Soils Volatiles

SITE	SITE 6	SITE 6	BLANK	SITE 6	SITE 6	SITE 6	BLANK	SITE 6	SITE 6	SITE 6	SITE 6	BLANK	SITE 6	SITE 6	SITE 6
SAMPLE NUMBER	BC-61-26	BC-61-27	BC-60-29 *	BC-62-30	BC-62-31 #	BC-63-33	BC-60-34	BC-64-35	BC-64-36	BC-65-37 #	BC-66-67	BC-60-68 *	BC-67-69	BC-68-70	BC-69-71
SAMPLE DEPTH	0-10'	10'-20'		5'-15'	5'-15'	10'-20'		5'-20'	5'-20	5'-15'	20'-30'		10'-25'	10'-20'	35'-40'
DATE SAMPLED	1-12-87	1-12-87	1-14-87	1-14-87	1-14-87	1-26-87	1-26-87	1-26-87	1-26-87	1-27-87	2-23-87	2-24-87	2-24-87	2-24-87	2-24-87
1 Chloromethane															
2 Bromomethane															
3 Vinyl Chloride															
4 Chloroethane															
5 Methylene Chloride	8 BJ	15 B	9 BJ	6223 B	7112 B	602 B	4 BJ	3 BJ	3 BJ	851 BJ	1082 BJ	48 B	646 BJ	871 BJ	465 BJ
6 Acetone	32 B	266 B		4699 B	3040 BJ	10500 B	20 B	1980 EB	2250 EB	3302 B	4110 B	18 B	15385 B	12857 B	6047 B
7 Carbon Disulfide															
8 1,1-Dichloroethene															
9 1,1-Dichloroethane															
10 trans-1,2-Dichloroethene														700 J	
11 Chloroform															11628
12 1-2-Dichloroethane											435 J				
13 2-Butanone (MEK)	36 B	29 B	27 B	15200 B	17700 B	8100 B		22 B	15 B	3683 B	8941 B	27 B	9692 B	12286	9555 B
14 1,1,1-Trichloroethane															
15 Carbon Tetrachloride															
16 Vinyl Acetate															
17 Bromodichloromethane															
18 1,2-Dichloropropane															
19 trans-1,3-Dichloropropene															
20 Trichloroethene										762 J	1141 J		3846	2000 J	
21 Dibromochloromethane															
22 1,1,2-Trichloroethane															
23 Benzene								3 J	5 J	10160	9882		21538	5143	45749
24 cis-1,3-Dichloropropene															
25 2-Chloroethyl Vinyl Ether															
26 Bromoform															
27 4-Methyl-2-pentanone										635 J	1176 J		4154	6000	
28 2-Hexanone															
29 Tetrachloroethene		9 J		13970	5207					3556	11765		44615	58571	12791
30 1,1,2,2-Tetrachloroethane															581 J
31 Toluene				806 J						27940	117647		38462	12143	94186
32 Chlorobenzene				504 J		1600		107	150	2413	27059 B	1 J	538462 E	100000 B	197674 E
33 Ethylbenzene						164 J				1245 J	980 J		16923	14286	7209
34 Styrene															
35 Total Xylenes						92				2794	2235		41538	75714	16279 B

Surface Soil Inorganic

SITE	BLANK	BLANK	SITE J	SITE J	SITE J
SAMPLE NUMBER	DC-SS-44*	DC-SS-45*	DC-SS-46	DC-SS-47	DC-SS-48*
LOCATION/GRID			SE	NE	NE
DATE SAMPLED	11-13-86	11-11-86	11-13-86	11-13-86	11-13-86
1 Aluminum	7320	9860	8810	630	651
2 Antimony					
3 Arsenic		7 B	5.3 B	9.1 B	6.4 B
4 Barium	441	336	346	25	26
5 Beryllium					
6 Boron					
7 Cadmium	1.5 RB	1.6	2.3 RF	13 RB	9.9 RB
8 Chromium, trivalent	11 RB	13	123 RB	690 RB	500 RB
9 Cobalt	[4.1]	4.9		[19]	[13]
10 Copper	33	31	135	614	[615]
11 Iron	13400 B	16200	57500 B	243000 B	201000
12 Lead	60 B	60 B	34 B	23 B	30 B
13 Manganese	336 RF	381	627 RF	2100 RF	1030 RF
14 Mercury			0.41		
15 Nickel	15 B	16	59 B	350 B	377 B
16 Selenium					
17 Silver					
18 Thallium					
19 Tin					
20 Vanadium	19	22			
21 Zinc	170	162	65	66	34
22 Cyanide					

Surface Soil Inorganic

SITE	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6
SAMPLE NUMBER	DC-SS-29	DC-SS-30	DC-SS-31	DC-SS-32	DC-SS-33	DC-SS-34	DC-SS-35	DC-SS-36
LOCATION/GRID	A-5	B-5	B-5	C-5	D-5	E-5	F-5	G-5
DATE SAMPLED	11-11-86	11-11-86	11-11-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86
1 Aluminum	19500	2890	4790	12700	14300	5720	2830	6370
2 Antimony					19			
3 Arsenic	10 B	80 B	74 B	0.6 B	16 B	25 B	16 B	4.6 B
4 Barium	3760	1830	1290	1390	1340	9200	533	1750
5 Beryllium								
6 Boron								
7 Cadmium	8 R	11 R	0.7 R	0.1 R	5.2 R	6.3 R	5.3 R	15 R
8 Chromium, trivalent	12 R	20 R	29 R	21 R	14 R	24 R	20 R	49 R
9 Cobalt	[10]	[3.3]		[4.0]		[12]	[2.4]	[9.7]
10 Copper	409	852	626	1020	396	433	317	3500
11 Iron	12500 R	34000 B	82900 B	17500	12400 B	16400 B	23400 B	20400 B
12 Lead	279 R	304 B	232 B	1270 B	417 B	310 B	205 B	609 B
13 Manganese	73 R	238 R	400 R	191 R	43 R	119 R	102 R	243 R
14 Mercury	0.66	23	10	0.91	0.9	2	2.2	5
15 Nickel	111 B	52 B	35 B	29 B		21 B	15 B	95 B
16 Selenium								1.9
17 Silver		3.6 R		5.4 R	4.1 R			0.9 R
18 Thallium								
19 Tin		12	14					14
20 Vanadium	11	204	632	30	16	112	39	132
21 Zinc	3000	67000	20600	1090	44400	12000	21700	4900
22 Cyanide						7	22	

SITE	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6
SAMPLE NUMBER	DC-SS-37	DC-SS-38	DC-SS-39	DC-SS-40	DC-SS-41	DC-SS-42	DC-SS-43
LOCATION/GRID	H-5	A-6	B-6	C-6	D-6	F-6	B-7
DATE SAMPLED	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86
1 Aluminum	4560	2630	4890	7640	10300	3540	8960
2 Antimony			16	10			
3 Arsenic	5.2 B	4.1 B	17 B	10 B	42 B	12 B	8 B
4 Barium	3070	10300	4400	1940	5210	1960	360
5 Beryllium							
6 Boron							
7 Cadmium	26 R	2 R	9.7 R	26 R	0.1 R	13 R	14 R
8 Chromium, trivalent	45 R	19 R	26 R	106 R	20 R	21 R	66 R
9 Cobalt	[5.9]	[20]	[6.3]	[16]	[4.6]	[10]	[4.4]
10 Copper	2260	327	1090	1660	1510	1090	753
11 Iron	53900 B	9700 B	22600 B	75100 B	15300 B	26500 B	17790 B
12 Lead	724 B	105 B	725 B	10400 B	516 B	411 B	326 B
13 Manganese	746 R	50 R	193 R	457 R	77 R	331 R	159 R
14 Mercury	3	0.09	2.9	2.2	1.2	3	3.4
15 Nickel	53 B	35 B	159 B	70 B	30 B	145 B	27 B
16 Selenium	4.1		1.8	1.3			
17 Silver	8 R		6.9 R	19 R	3.9 R	3 R	3 R
18 Thallium							
19 Tin	10	16	17	22			
20 Vanadium	118	23	120	33	17	550	16
21 Zinc	4720	239	1660	6350	39000	2360	1500
22 Cyanide	2.3	1.4		13	1.8	1	

Surface Soil Inorganic

SITE	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6
SAMPLE NUMBER	BC-SS-15	BC-SS-16 B	BC-SS-17	BC-SS-18	BC-SS-19	BC-SS-20	BC-SS-21	BC-SS-22	BC-SS-23	BC-SS-24	BC-SS-25 B	BC-SS-26	BC-SS-27	BC-SS-28
LOCATION/GRID	B-3	G-3	H-3	A-4	B-4	C-4	D-4	E-4	F-4	G-4	G-4	H-4	I-4	J-4
DATE SAMPLED	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86
1 Aluminum	6960	6370	8890	4860	4790	9410	6960	4990	9620	4470	5720	16300	5040	19900
2 Antimony	14	28												
3 Arsenic	36 R	30 R	33 R	64 R	57 R	40 R	14 R	23 R	22 R	39 B	24 B	11 B	10 B	11 B
4 Barium	1180	1800	1860	13900	1010	4700	10600	19300	4340	6320	2220	3190	1460	1000
5 Beryllium														1.4
6 Boron														
7 Cadmium	46	45	37	7.2	10	11	5	8.7	20	17 RB	20 RB	21 RB	27 RB	5.2 RB
8 Chromium, trivalent	147	98	66	137	47	34	44	81	48	41 RB	50 RB	137 RB	22 RB	92 RB
9 Cobalt	11	11	7.3	13	3.8	6.7	12	10	39		(5.0)	(6.3)	(5.2)	(3.9)
10 Copper	2170	1620	916	246	637	639	444	684	1950	1480	1900	1020	640	4000
11 Iron	75000	100000	46000	46800	40600	25000	33600	15900	39900	26000 B	29200 B	33900 B	28700 B	35600 B
12 Lead	1240 B	1610 B	1470 B	207 B	263 B	1070 B	402 B	296 B	11700 B	418 B	437 B	500 B	440 B	873 B
13 Manganese	770	874	534	193	223	104	316	278	10000	184 RB	204 RB	326 RB	239 RB	247 RB
14 Mercury	3.2	5.8	6.6	0.57	12	2.3	3	2.7	11	1.02	1.13	1.6	26	3
15 Nickel	122	109	87	93	84	39	52	33	50	105 B	135 B	60 B	34 B	86 B
16 Selenium					3									
17 Silver	6.4	5.4	6.1			3.3			33	3.7 RB	3.4 RB	3.5 RB		
18 Thallium					21									
19 Tin	34	34			163						16			43
20 Vanadium	133	140	211	25	19400	20	69	41	166	64	75	100	59	75
21 Zinc	22000	15600	5100	32100	3.9	46700	814	7100	24200	32200	41400	4660	4520	3200
22 Cyanide	1.6						4.4	3.2	2.7	1.3	1.7			2.5

Surface Soil Inorganic

SITE	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6
SAMPLE NUMBER	BC-SS-01	BC-SS-02	BC-SS-03	BC-SS-04	BC-SS-05	BC-SS-06	BC-SS-07	BC-SS-08	BC-SS-09	BC-SS-10	BC-SS-11	BC-SS-12	BC-SS-13	BC-SS-14
LOCATION/GRID	C-1	B-1	D-2	E-2	H-2	H-2	I-2	I-2	A-3	B-3	C-3	D-3	E-3	F-3
DATE SAMPLED	11-10-86	11-10-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86
1 Aluminum	11400	10900	7020	9670	15300	16500	7610	5950	9290	7000	2790	23300	4700	4710
2 Antimony														
3 Arsenic	6.0 R	4.9 R	5.7 R	5.0 R	5.0	5.7 R	7.5	5.6 R	13 R	5.4 R	5.6 R	26 R	12 R	8 R
4 Barium	163	174	151	145	222	224	202	130	13000	575	20200	7340	169000	67300
5 Beryllium														
6 Boron														
7 Cadmium	2.6	3.4	1.0	1.7	6.3	4.8	10	3.3	10	4.4	4.5	8.1	6	4
8 Chromium, trivalent	16	15	12	14	21	22	19	11	119	52	39	46	24	52
9 Cobalt	6.2	7.0	6.4	6.4	8	9.3	6	5.6	15	8.5	12	13	89	27
10 Copper	327	344	162	245	392	372	2220	675	1200	260	487	1430	624	483
11 Iron	19000	20300	15700	17400	25900	27600	20300	13000	38600	10000	29800	45000	22200	22400
12 Lead	103 J	134 J	60 J	99 J	252 J	230 J	514 J	131 J	655 J	334*J	614 J	711 J	310 J	2950 J
13 Manganese	336	295	300	329	339	390	291	217	322	171	96	150	129	191
14 Mercury	0.16	0.23			0.11	0	0		6.6	1.3	1.7	14	2	7.4
15 Nickel	22	25	18	22	35	33	24	16	360	84	61	382	62	48
16 Selenium														
17 Silver									4.2	5				
18 Thallium														
19 Tin														
20 Vanadium	25	26	20	23	35	30	22	16	139	31	75	129	29	46
21 Zinc	299	406	100	201	619	613	975	354	4500	5130	794	23900	8110	1040
22 Cyanide											4.0	3.3	2	7.0

Surface Soils Pest/PCBs

SITE	SITE J	SITE J	SITE J
SAMPLE NUMBER	DC-SS-46	DC-SS-47	DC-SS-48
LOCATION/GRID	SE	NE	NE
DATE SAMPLED	11-13-86	11-13-86	11-13-86
1 Alpha-BHC			
2 Beta-BHC			
3 Delta-BHC			
4 Gamma-BHC (Lindane)			
5 Heptachlor			
6 Aldrin			
7 Heptachlor Epoxide			
8 Endosulfan I			
9 Dieldrin			
10 4,4'-DDE			
11 Endrin			
12 Endosulfan II			
13 4,4'-DDD			
14 Endosulfan Sulfate			
15 4,4'-DDT			
16 Methoxychlor			
17 Endrin Ketone			
18 Chlordane			
19 Toxaphene			
20 AROCLOR-1016			
21 AROCLOR-1221			
22 AROCLOR-1232			
23 AROCLOR-1242			
24 AROCLOR-1248			
25 AROCLOR-1254			
26 AROCLOR-1260			

Surface Soils Pest/PCBs

SITE	SITE 6	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8
SAMPLE NUMBER	BC-SS-31 *	BC-SS-32	BC-SS-33	BC-SS-34	BC-SS-35	BC-SS-36	BC-SS-37	BC-SS-38
LOCATION/GRID	B-5	C-5	D-5	E-5	F-5	G-5	H-5	A-6
DATE SAMPLED	11-11-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86
1 Alpha-BHC								
2 Beta-BHC								
3 Delta-BHC								
4 Gamma-BHC (Lindane)								
5 Heptachlor								
6 Aldrin								
7 Heptachlor Epoxide								
8 Edosulfan I								
9 Dieldrin								
10 4,4'-DDE								
11 Endrin								
12 Edosulfan II								
13 4,4'-DDD								
14 Endosulfan Sulfate								
15 4,4'-DDT								
16 Methoxychlor								
17 Endrin Ketone								
18 Chlordane								
19 Toxaphene								
20 AROCLOR-1016								
21 AROCLOR-1221								
22 AROCLOR-1232								
23 AROCLOR-1242								
24 AROCLOR-1248								
25 AROCLOR-1254								
26 AROCLOR-1260		12600 J	25600 J	5250000 C	96000	144000 C	151000 J	8700

SITE	SITE 8	SITE 8	SITE 8	SITE 8	SITE 6	BLANK	BLANK
SAMPLE NUMBER	BC-SS-39	BC-SS-40	BC-SS-41	BC-SS-42	BC-SS-43	BC-SS-44 *	BC-SS-45*
LOCATION/GRID	B-6	C-6	D-6	F-6	B-7		
DATE SAMPLED	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-13-86	11-11-86
1 Alpha-BHC							
2 Beta-BHC							
3 Delta-BHC							
4 Gamma-BHC (Lindane)							
5 Heptachlor							
6 Aldrin							
7 Heptachlor Epoxide							
8 Edosulfan I							
9 Dieldrin							
10 4,4'-DDE							
11 Endrin							
12 Edosulfan II							
13 4,4'-DDD							
14 Endosulfan Sulfate							
15 4,4'-DDT							
16 Methoxychlor							
17 Endrin Ketone							
18 Chlordane							
19 Toxaphene							
20 AROCLOR-1016							
21 AROCLOR-1221							
22 AROCLOR-1232							
23 AROCLOR-1242							
24 AROCLOR-1248			26600 J		1700u		
25 AROCLOR-1254		119000 JC					
26 AROCLOR-1260	544000	279000 C	85000	52000	30100		

Surface Soils Pest/PCBs

SITE	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6
SAMPLE NUMBER	BC-SS-16 D	BC-SS-17	BC-SS-18	BC-SS-19	BC-SS-20	BC-SS-21	BC-SS-22	BC-SS-23	BC-SS-24	BC-SS-25 D	BC-SS-26	BC-SS-27	BC-SS-28	BC-SS-29	BC-SS-30
LOCATION/GRID	G-3	H-3	A-4	B-4	C-4	D-4	E-4	F-4	G-4	G-4	H-4	I-4	J-4	A-5	B-5
DATE SAMPLED	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86
1 Alpha-BHC															
2 Beta-BHC															
3 Delta-BHC															
4 Gamma-BHC (Lindane)															
5 Heptachlor															
6 Aldrin															
7 Heptachlor Epoxide															
8 Endosulfan I															
9 Dieldrin															
10 4,4'-DDE															
11 Endrin															
12 Endosulfan II															
13 4,4'-DDD															
14 Endosulfan Sulfate															
15 4,4'-DDT															
16 Methoxychlor															
17 Endrin Ketone															
18 Chlordane															
19 Toxaphene															
20 AROCLOR-1016															
21 AROCLOR-1221															
22 AROCLOR-1232															
23 AROCLOR-1242															
24 AROCLOR-1248	171000		1700000	3600000 C			145000 JC	110000 C						21000	30300
25 AROCLOR-1254				7500000 C		2700000							246000 J		
26 AROCLOR-1260	232000 J	2700000 JC		8000000 C	639000		547000 C	218000 C	117000 J	122000 J	120000	2200000 C	625000	23000	35600

Surface Soil Semivolatiles

SITE	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 6	SITE 6	SITE 6
SAMPLE NUMBER	BC-SS-29	BC-SS-30	BC-SS-31	BC-SS-32	BC-SS-33	BC-SS-34	BC-SS-35	BC-SS-36	BC-SS-37	BC-SS-38	BC-SS-39	BC-SS-40	BC-SS-41	BC-SS-42	BC-SS-43
LOCATION/GRID	A-5	B-5	D-5	C-5	D-5	E-5	F-5	G-5	H-5	A-6	B-6	C-6	D-6	F-6	D-7
DATE SAMPLED	11-11-86	11-11-86	11-11-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86	11-12-86
1 Dimethyl Phthalate															
2 Acenaphtylene															
3 3-Nitroaniline															
4 Acenaphthene								200 J							770 J
5 2,4-Dinitrophenol															
6 4-Nitrophenol												1000000			
7 Dibenzofuran								95 J							460 J
8 2,4-Dinitrotoluene															
9 2,6-Dinitrotoluene															
10 Diethylphthalate															
11 4-Chlorophenyl-Phenylether															
12 Fluorene															1500 J
13 4-Nitroaniline															
14 4,6-Dinitro-2-methylphenol															
15 N-Nitrosodiphenylamine															
16 4-Bromophenyl-phenylether															
17 Hexachlorobenzene															
18 Pentachlorophenol						9900 J		1600 J			21000000	1100 J		20000	25000
19 Phenanthrene								2000	4900 J			920 J			15000
20 Anthracene								600				810 J			4100
21 Di-n-butyl phthalate												800 J			
22 Fluoranthene								4600				2600			20000
23 Pyrene								3100		5000 J		2400			19000
24 Butyl Benzyl phthalate															
25 3,3'-Dichlorobenzidine															
26 Benzo(a)Anthracene								2100				1400 J			10000
27 bis(2-ethylhexyl) phthalate	2900 J				1400 J							2500			
28 Chrysene								2700		8400 J		2500			10000
29 Di-n-octyl phthalate					2000 BJ										
30 Benzo(b)Fluoranthene								4000				3600			15000
31 Benzo(k)Fluoranthene														750 J	
32 Benzo(a)Pyrene								1900		1900 J	3900 J	1700 J		180 J	7800
33 Indeno(1,2,3-cd)Pyrene								1700				2100			5200
34 Benzo(g,h,i)Perylene								550 J				550 J			1530 J
35 Dibenz(a,h)Anthracene								1500				2400			5400

Surface Soil Semivolatiles

SITE	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8
SAMPLE NUMBER	DC-SS-15	DC-SS-16	DC-SS-17	DC-SS-18	DC-SS-19	DC-SS-20	DC-SS-21	DC-SS-22	DC-SS-23	DC-SS-24	DC-SS-25	DC-SS-26	DC-SS-27	DC-SS-28
LOCATION/GRID	B-3	B-3	H-3	A-4	B-4	C-4	D-4	E-4	F-4	G-4	G-4	H-4	I-4	J-4
DATE SAMPLED	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86
1 Dimethyl Phthalate														
2 Acenaphthylene														
3 3-Nitroaniline														
4 Acenaphthene		1000 J	1100 J						70 J					
5 2,4-Dinitrophenol														
6 4-Nitrophenol														
7 Dibenzofuran														
8 2,4-Dinitrotoluene														
9 2,6-Dinitrotoluene														
10 Diethylphthalate														
11 4-Chlorophenyl-Phenylether														
12 Fluorene														
13 4-Nitroaniline														
14 4,6-Dinitro-2-methylphenol														
15 N-Nitrosodiphenylamine														
16 4-Bromophenyl-phenylether														
17 Hexachlorobenzene			10000 J											
18 Pentachlorophenol	1200000	1400000							12000		10000 J			23000 J
19 Phenanthrene	40000 J	37000 J	8700 J						1200				100 J	
20 Anthracene									300 J					
21 Di-n-butyl phthalate						3000 BJ		360 BJ	1700 B				330 BJ	
22 Fluoranthene	44000	45000							2200		6700 J	4800 J		
23 Pyrene	85000	71000	3000 J						856	5500 J	9000 J			
24 Butyl Benzyl phthalate														
25 3,3'-Dichlorobenzidine		86000												
26 Benzo(a)Anthracene		27000 J							960		5100 J			
27 bis(2-ethylhexyl) phthalate									660					
28 Chrysene	39000 J	39000 J							1100		6400 J		270 J	
29 Di-n-octyl phthalate								140 BJ	99 BJ					
30 Benzo(b)Fluoranthene	47000	48000							1000					
31 Benzo(k)Fluoranthene										10000 J	10000 J			
32 Benzo(a)Pyrene	22000 J	20000 J							840		4500 J			
33 Indeno(1,2,3-cd)Pyrene									1100					
34 Benzo(g,h,i)Perylene									430					
35 Dibenz(a,h)Anthracene									1200					

Surface Soils Pest/PCBs

SITE	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6
SAMPLE NUMBER	DC-SS-01	DC-SS-02	DC-SS-03	DC-SS-04	DC-SS-05	DC-SS-06	DC-SS-07	DC-SS-08
LOCATION/GRID	C-1	B-1	D-2	E-2	H-2	H-2	I-2	I-2
DATE SAMPLED	11-10-86	11-10-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86
1 Alpha-BHC								
2 Beta-BHC								
3 Delta-BHC								
4 Gamma-BHC (Lindane)								
5 Heptachlor								
6 Aldrin								
7 Heptachlor Epoxide								
8 Endosulfan I								
9 Dieldrin								
10 4,4'-DDE		31 J			79	31	290	84
11 Endrin								
12 Endosulfan II								
13 4,4'-DDD								
14 Endosulfan Sulfate								
15 4,4'-DDT								
16 Methoxychlor								
17 Endrin Ketone								
18 Chlordane								
19 Toxaphene								
20 AROCLOR-1016								
21 AROCLOR-1221								
22 AROCLOR-1232								
23 AROCLOR-1242								
24 AROCLOR-1248								
25 AROCLOR-1254								1030
26 AROCLOR-1260		450		751	990	740	3000	1030

SITE	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6
SAMPLE NUMBER	DC-SS-09	DC-SS-10	DC-SS-11	DC-SS-12	DC-SS-13	DC-SS-14	DC-SS-15
LOCATION/GRID	A-3	B-3	C-3	D-3	E-3	F-3	G-3
DATE SAMPLED	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86
1 Alpha-BHC							
2 Beta-BHC							
3 Delta-BHC							
4 Gamma-BHC (Lindane)							
5 Heptachlor							
6 Aldrin							
7 Heptachlor Epoxide							
8 Endosulfan I							
9 Dieldrin							
10 4,4'-DDE							
11 Endrin							
12 Endosulfan II							
13 4,4'-DDD							
14 Endosulfan Sulfate							
15 4,4'-DDT							
16 Methoxychlor							
17 Endrin Ketone							
18 Chlordane							
19 Toxaphene							
20 AROCLOR-1016							
21 AROCLOR-1221							
22 AROCLOR-1232							
23 AROCLOR-1242							
24 AROCLOR-1248	2730000 C	44000	24000000 C				184000
25 AROCLOR-1254			29000000 C				
26 AROCLOR-1260			21000000 C	174000 C	165000 J	807000	305000 J

Surface Soil Semivolatiles

SITE	BLANK	BLANK	SITE J	SITE J	SITE J
SAMPLE NUMBER	BC-SS-44*	BC-SS-45*	BC-SS-46	BC-SS-47	BC-SS-48
LOCATION/GRID			SE	NE	NE
DATE SAMPLED	11-13-86	11-11-86	11-13-86	11-13-86	11-13-86
1 Dimethyl Phthalate					
2 Acenaphtylene					
3 3-Nitroaniline					
4 Acenaphthene					
5 2,4-Dinitrophenol					
6 4-Nitrophenol					
7 Dibenzofuran					
8 2,4-Dinitrotoluene					
9 2,6-Dinitrotoluene					
10 Diethylphthalate					
11 4-Chlorophenyl-Phenylether					
12 Fluorene					
13 4-Nitroaniline					
14 4,6-Dinitro-2-methylphenol					
15 N-Nitrosodiphenylamine					
16 4-Bromophenyl-phenylether					
17 Hexachlorobenzene					
18 Pentachlorophenol					
19 Phenanthrene					
20 Anthracene					
21 Di-n-butyl phthalate	150 J	1500 B	1600 B	230 J	
22 Fluoranthene					
23 Pyrene					
24 Butyl Benzyl phthalate					
25 3,3'-Dichlorobenzidine					
26 Benzo(a)Anthracene					
27 bis(2-ethylhexyl) phthalate			240 J		
28 Chrysene					
29 Di-n-octyl phthalate		79 BJ			
30 Benzo(b)Fluoranthene	81 J				
31 Benzo(k)Fluoranthene					
32 Benzo(a)Pyrene					
33 Indeno(1,2,3-cd)Pyrene					
34 Benzo(g,h,i)Perylene					
35 Dibenz(a,h)Anthracene					

Surface Soil Semivolatiles

	SITE	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6	SITE 6
	SAMPLE NUMBER	BC-SS-01	BC-SS-02	BC-SS-03	BC-SS-04	BC-SS-05	BC-SS-06	BC-SS-07	BC-SS-08	BC-SS-09	BC-SS-10	BC-SS-11	BC-SS-12	BC-SS-13	BC-SS-14
	LOCATION/GRID	C-1	B-1	B-2	E-2	H-2	H-2	I-2	I-2	A-3	B-3	C-3	D-3	E-3	F-3
	DATE SAMPLED	11-10-86	11-10-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86	11-11-86
1	Dimethyl Phthalate														
2	Acenaphtylene														
3	3-Nitroaniline														
4	Acenaphthene											570 J			
5	2,4-Dinitrophenol														
6	4-Nitrophenol														
7	Dibenzofuran											929 J			
8	2,4-Dinitrotoluene														
9	2,6-Dinitrotoluene														
10	Diethylphthalate														
11	4-Chlorophenyl-Phenylether														
12	Fluorene														
13	4-Nitroaniline														
14	4,6-Dinitro-2-methylphenol														
15	N-Nitrosodiphenylamine														
16	4-Bromophenyl-phenylether														
17	Hexachlorobenzene														
18	Pentachlorophenol									2600 J		4700 J	7800 J		
19	Phenanthrene											6000 J			
20	Anthracene														
21	Di-n-butyl phthalate				170 BJ	2000 B		460 BJ	320 BJ						
22	Fluoranthene							600		540 J			1300 J		
23	Pyrene							290 J					1100 J		
24	Butyl Benzyl phthalate														
25	3,3'-Dichlorobenzidine														
26	Benzo(a)Anthracene							220 J		950 J					
27	bis(2-ethylhexyl) phthalate		910	230 J	470			170 J	140 J	240 J		6000	820 J		
28	Chrysene							310 J							4400 J
29	Di-n-octyl phthalate										610 BJ	2600 BJ	3100 E		14000 D
30	Benzo(b)Fluoranthene							610		750 J			1200 J		
31	Benzo(k)Fluoranthene								160 J						
32	Benzo(a)Pyrene							190 J	47 J				520 J		
33	Indeno(1,2,3-cd)Pyrene							200 J							
34	Benzo(g,h,i)Perylene							84 J							
35	Dibenz(a,h)Anthracene							230 J		1100 J					

Surface Soils Semivolatiles

SITE	BLANK	BLANK	SITE J	SITE J	SITE J
SAMPLE NUMBER	DC-SB-44+	DC-SB-45+	DC-SS-46	DC-SS-47	DC-SS-48I
LOCATION/GRID			SE	NE	NE
DATE SAMPLED	11-13-86	11-11-86	11-13-86	11-13-86	11-13-86
1 Phenol					
2 bis(2-Chloroethyl)ether					
3 2-Chlorophenol					
4 1,3-Dichlorobenzene					
5 1,4-Dichlorobenzene					
6 Benzyl Alcohol					
7 1,2-Dichlorobenzene					
8 2-Methylphenol					
9 bis(2-Chloroisopropyl) ether					
10 4-Methylphenol					
11 N-Nitroso-n-Dipropylamine					
12 Hexachloroethane					
13 Nitrobenzene					
14 Isophorone					
15 2-Nitrophenol					
16 2,4-Dimethylphenol					
17 Benzoic Acid					
18 bis-(2-Chloroethoxy)methane					
19 2,4-Dichlorophenol					
20 1,2,4-Trichlorobenzene					
21 Naphthalene					
22 4-Chloroaniline					
23 Hexachlorobutadiene					
24 4-Chloro-3-methylphenol					
25 2-Methylnaphthalene					
26 Hexachlorocyclopentadiene					
27 2,4,6-Trichlorophenol					
28 2,4,5-Trichlorophenol					
29 2-Chloronaphthalene					
30 2-Nitroaniline					

Subsurface Soil Inorganics

SITE	SITE P	SITE P	SITE P	SITE O	SITE O	SITE O	SITE O	SITE O	SITE O	BLANK	SITE O	SITE O	SITE O	SITE O	SITE O
SAMPLE NUMBER	DC-P2-54	DC-P5-55	DC-P5-56	DC-01-59	DC-02-60	DC-03-61	DC-04-62	DC-05-63	DC-05-64	DC-00-65	DC-06-66	DC-09-72	DC-09-73	DC-010-74	DC-010-75
SAMPLE DEPTH	25'-35'	10'-25	10'-25'	15'-25'	20'-30'	10'-20'	0-10'	0.5'-20'	0.5'-20'		15'-25'	0-10'	15'-20'	5'-10'	10'-15'
DATE SAMPLED	2-11-87	2-12-87	2-12-87	2-16-87	2-17-87	2-17-87	2-17-87	2-17-87	2-17-87	2-18-87	2-18-87	2-26-87	2-26-87	2-26-87	2-26-87
1 Aluminum	1270	6136	5530	2023	1923	3706	5005	3232	3061	6215	2100	4902	5306	5030	2114
2 Antimony															
3 Arsenic		3 B	4 B			4 B		3 B	3 B	8 B	2 B	6 B	3 B	7 B	3 B
4 Barium		88	119	37		131	214	106	101	411		163	128	150	45
5 Beryllium															
6 Boron															
7 Cadmium							31			2		4		11	
8 Chromium, trivalent	3	14	10	5	6	9	18	7	6	10	5	13	6	22	4
9 Cobalt															
10 Copper		16	24			8	205	7		33		59		241	15
11 Iron	4131	15309	13000	5233	5705	9548	11059	8902	8232	12658	4015	11793	7500	11910	5648
12 Lead	4 J	526 J	90 J	3 J	6 J	7 J	147 J	7 J	9 J	54 J	4 J	18 J	5 J	71 J	6 J
13 Manganese	93 J	673 J	710 J	106 J	100 J	233 J	329 J	207 J	107 J	357 J	79 J	190 J	152 J	206 J	101 J
14 Mercury	0.6						6.3					1.7	0.3	1.9	
15 Nickel		15 J	23 J				45 J	11 J	10 J	15 J		38		136 J	11 J
16 Selenium															
17 Silver															
18 Thallium															
19 Tin															
20 Vanadium		22	16			13	18			15		19		15	
21 Zinc	17 J	49 J	74 J	18 J	18 J	54 J	1398	37 J	35 J	101 J	17 J	277	30 J	600 J	43 J
22 Cyanide	13	15													

Subsurface Soil Inorganics

SITE	SITE J	SITE J	SITE K	SITE K	SITE K	BLANK	SITE L	SITE L	SITE L	SITE L	SITE L	SITE M	SITE M	BLANK	SITE P
SAMPLE NUMBER	DC-J2-12	DC-J3-13	DC-K1-08	DC-K2-25	DC-K3-32	DC-LB-01 *	DC-L1-02	DC-L2-03	DC-L3-04	DC-L4-09	DC-L4-10 D	DC-M1-05	DC-M2-06	DC-MB-07 *	DC-P1-53
SAMPLE DEPTH	15'-25'	0-10'	0-16'	0-10'	10'-20'		5'-10'	5'-15'	5'-15'	10'-20'	10'-20'	6-10'	5'-15'		6-10'
DATE SAMPLED	12-17-86	12-17-86	12-16-87	1-12-87	1-22-87	12-12-86	12-12-86	12-12-86	12-12-86	12-17-86	12-17-86	12-15-86	12-15-86	12-16-86	2-11-87
1 Aluminum	3026	2322	4700	9073	10076	9397	10697	5205	7380	1120	1370	4763	1924	9385	5013
2 Antimony								32							
3 Arsenic	2 B	6 B	9 B	8 R	9 R	6 B	5 B		172	55 B	68 B	3 B	2 B	6 B	
4 Barium	106	44	112	202	192	410	197	192	192	114	142	130	46	358	126
5 Beryllium															
6 Boron															
7 Cadmium		4	2	1	4			6						2	4
8 Chromium, trivalent	7	55	351	22	15		16	15	10		3	8	5	13	16
9 Cobalt	4	5	11				6	9	9			4	3	7	
10 Copper	6	83	44	39	129		12	105	141	82	101	10	5	33	50
11 Iron	7320	5409	17765	22439	20000	13846	16053	5564	11899	1560	1446	820	6253	16026	12750
12 Lead	5 B	10 B	107 B	132 R	230 R	43 B	9 B	106	41	5 B	5 B	24	34 B	78 B	
13 Manganese	113	877	499	380	606	343	255	44	149	10	10	164	82	429	201 B
14 Mercury			2.2	0.4	0.2				0.1				9		3.9
15 Nickel	8	72	20	20	21	14	21	400	2392	83	93	11		18	25 B
16 Selenium															
17 Silver															
18 Thallium															
19 Tin					13										
20 Vanadium			16	29	27	22	25	18	19					21	19
21 Zinc	24	70	235	245	503	178	59	144	166	11	10	42	65	182	463 B
22 Cyanide			9												

Subsurface Soil Inorganics

SITE	SITE I	SITE I	SITE T	BLANK	SITE I	SITE T	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE T	SITE J
SAMPLE NUMBER	BC-15-41	BC-15-42	BC-16-43	BC-18-44	BC-17-45	BC-17-46	BC-17-47 B	BC-19-48	BC-19-49	BC-110-50	BC-111-51	BC-111-52	BC-112-57	BC-112-58	BC-J1-11
SAMPLE DEPTH	5'-27.5'	20'-30'	10'-25'		3.5'-12.5'	13'-23'	13'-23'	6'-23'	24'-30'	15'-30'	6'-20'	26'-39'	3.5'-12.5'	18.5'-27.5'	10'-20'
DATE SAMPLED	1-30-87	1-30-87	2-2-87	2-3-87	2-3-87	2-3-87	2-3-87	2-4-87	2-4-87	2-4-87	2-5-87	2-5-87	2-13-87	2-13-87	12-17-86
1 Aluminum	2063	3060	1752	8103	7195	2063	2707	8097	1556	1607	6650	1011	1409	1205	6904
2 Antimony		14	10	15							6663				
3 Arsenic	3		14	7	5	3	2	14		1			2 B		3 B
4 Barium	3544		400	347	330	83	82	519			8				156
5 Beryllium											1530				
6 Boron															
7 Cadmium	2		2	2	2			13							
8 Chromium, travalent	35		731	12	23	5	5	96	4	6	7		4	4	9
9 Cobalt	22		22					34		13	140				4
10 Copper	157		109	20	258			575			23				9
11 Iron	11410	3553	23231	14744	14935	7300	7460	27647	4667	4607	543	2067	4099	4207	[illegible]
12 Lead	232 B	6 B	292 B			10 B	10 B	5647 B	704	9 B	23333	29 B	7 B	3 B	7 B
13 Manganese	115 R	35 R	143 R	395 R	240 R	124 R	125 R	240 R	35 R	61 R	5403 B	43 R	98 B	63 B	250
14 Mercury	1.1		1.5					3.2			240 R				
15 Nickel	2005	31	51	15	35		11	206		145	0.9	11			11
16 Selenium											1320				
17 Silver															
18 Thallium															
19 Tin			14	4	11	8	3	20	5	2					
20 Vanadium	20		69	21	10			40							15
21 Zinc	201	13	652	203	439	29	27	1156	125	89	43	10	21 B	20 B	36
22 Cyanide	3							2			3103				

Subsurface Soil Inorganics

SITE	SITE M	SITE M	SITE M	SITE M	SITE M	SITE M	BLANK	SITE M	SITE M	SITE M	SITE M	SITE M	SITE I	SITE I	SITE I
SAMPLE NUMBER	DC-M1-14	DC-M1-15	DC-M2-16	DC-M3-17	DC-M3-18 *	DC-M4-19	DC-MB-20 *	DC-M5-21	DC-M6-22	DC-M7-23	DC-M8-24	DC-M9-28	DC-11-38	DC-12-39	DC-13-40
SAMPLE DEPTH	15'-25'	35'-50'	5'-20'	10'-20'	10'-20'	10'-25'		0-10'	35'-50'	35'-50'	5'-15'	15'-25'	0-16'	5'-25'	5'-15'
DATE SAMPLED	12-18-86	12-18-87	1-5-87	1-6-87	1-6-87	1-6-87	1-7-87	1-7-87	1-8-87	1-8-87	1-9-87	1-13-87	1-27-87	1-28-87	1-29-87
1 Aluminum	2403	1032	4015	450	697	7167	10974	7074	2811	2282	12117	2203	13540	1259	12324
2 Antimony															
3 Arsenic	26 B	3 B	7 R	15 R	13 R	300 R	6 R	42 R			4 R	3 R	11		6
4 Barium	3242	38	1079	85	97	607	372	331	55	46	218	52	3603	919	334
5 Beryllium															
6 Boron															
7 Cadmium	232		5			294		221					11	6	3
8 Chromium, trivalent	100	4	97			51	15	56	6	5	18		115	15	16
9 Cobalt	19	3	105			47	6	8						27	14
10 Copper	374	3	415	13	12	2444	29	972			51		630	84	508
11 Iron	40226	3810	84545	510	564	54167	15641	27160	5905	4741	20519	5215	41507	10135	16752 B
12 Lead	1150 B	4 B	174 R	5 R	4 R	4500 R	44 R	3827 R	4 R	3 R	60 R	5 R	171 B	81 B	373
13 Manganese	2403	51	621	7	9	2292	376	36343	78	71	336	66	256 R	96 R	404 R
14 Mercury	0.8					3.9					1.4		2.2	0.5	
15 Nickel	15097	90	290	6	4	2003	17	42	9	9	16		111	981	20
16 Selenium	2														
17 Silver	4 R					9		44							
18 Thallium								1							
19 Tin	111		14			40							35		35
20 Vanadium	95					28	27	28	9	7	27		553	20	32
21 Zinc	39516	39	248	8	10	3075	153	8099	23	15	308	20	6329	491	331
22 Cyanide	2		2												

Subsurface Soil Inorganics

SITE	SITE 8	SITE 6	BLANK	SITE 8	SITE 8	SITE 6	BLANK	SITE 6
SAMPLE NUMBER	BC-61-26	BC-61-27	BC-60-29 *	BC-62-30	BC-62-31 #	BC-63-33	BC-60-34	BC-64-35
SAMPLE DEPTH	0-10'	10'-20'		5'-15'	5'-15'	10'-20'		5'-20'
DATE SAMPLED	1-12-87	1-12-87	1-14-87	1-14-87	1-14-87	1-26-87	1-26-87	1-26-87
1 Aluminum	9760	[illegible]	12021	5304	3300	12767	14359	8671
2 Antimony								
3 Arsenic	4 R	2 R	6 R	3 R	2 R	5	7	4
4 Barium	213	160	359	45949	15570	206	424	117
5 Beryllium								
6 Boron								
7 Cadmium			2	2			3	
8 Chromium, trivalent	9	6	13	10	5	16	13	9
9 Cobalt				56	19			
10 Copper	16		31	20	8	8	33	10
11 Iron	14000	9053	16202	13544	6392	12712	13046	8029
12 Lead	12 R	8 R	60 R	30 R	16 R	11 J	51 J	8 J
13 Manganese	300	179	410	242	92	270 R	302 R	102 R
14 Mercury	0.3							
15 Nickel	13		17	35		15	19	13
16 Selenium								
17 Silver								
18 Thallium								
19 Tin								
20 Vanadium	20	21	36	22	14	25	20	
21 Zinc	103	27	167	115	39	44	190	50
22 Cyanide								

SITE	SITE 6	SITE 6	SITE 6	BLANK	SITE 6	SITE 6	SITE 8
SAMPLE NUMBER	BC-64-36	BC-65-37 #	BC-66-67	BC-60-68 *	BC-67-69	BC-68-70	BC-69-71
SAMPLE DEPTH	5'-20	5'-15'	20'-30'		10'-25'	10'-20'	35'-40'
DATE SAMPLED	1-26-87	1-27-87	2-23-87	2-24-87	2-24-87	2-24-87	2-24-87
1 Aluminum	8200	9304	1059	6705	16615	8343	966
2 Antimony							
3 Arsenic	4	5		6 R	123 R	16 R	
4 Barium	140	233	142	363	1994	204	133
5 Beryllium							
6 Boron							
7 Cadmium				2	14	5	
8 Chromium, trivalent	7	16	12	11	905	109	11
9 Cobalt		16					13
10 Copper	3	16	10	30	2215	507	10
11 Iron	9900	11410	6035	12354	53692	12243	4056
12 Lead	32 J	14 J	25 J	57 J	3123 J	833 J	22 J
13 Manganese	209 R	461	73 J	357 J	202 J	193 J	43 J
14 Mercury						34.3	
15 Nickel	13	89	10 J	14	123 J	399 J	
16 Selenium							
17 Silver						12	
18 Thallium							
19 Tin					80	26	
20 Vanadium	19	27	31	16	1315	109	
21 Zinc	65	224	86 J	160 J	2954 J	4257 J	51
22 Cyanide							

Subsurface Soils Pest/PCBs

SITE	SITE P	SITE P	SITE P	SITE D	SITE D	SITE D	SITE D	SITE D	SITE D	BLANK	SITE D	SITE D	SITE D	SITE D	SITE D
SAMPLE NUMBER	DC-P2-54	DC-P5-55	DC-P5-56 #	DC-01-59	DC-02-60	DC-03-61	DC-04-62	DC-05-63	DC-05-64 #	DC-08-65 +	DC-06-66	DC-09-72	DC-09-73	DC-010-74	DC-010-75
SAMPLE DEPTH	25'-35'	10'-25	10'-25'	15'-25'	20'-30'	10'-20'	0-10'	0.5'-20'	0.5'-20'		15'-25'	0-10'	15'-20	5'-10'	10'-15
DATE SAMPLED	2-11-87	2-12-87	2-12-87	2-16-87	2-17-87	2-17-87	2-17-87	2-17-87	2-17-87	2-18-87	2-18-87	2-26-87	2-26-87	2-26-87	2-26-87
1 Alpha-BHC															
2 Beta-BHC															
3 Delta-BHC															
4 Gamma-BHC (Lindane)															
5 Heptachlor															
6 Aldrin															
7 Heptachlor Epoxide															
8 Endosulfan I															
9 Dieldrin															
10 4,4'-DDE															
11 Endrin															
12 Endosulfan II															
13 4,4'-DDD															
14 Endosulfan Sulfate															
15 4,4'-DDT															
16 Methoxychlor															
17 Endrin Ketone															
18 Chlordane															
19 Toxaphene															
20 AROCLOR-1016															
21 AROCLOR-1221															
22 AROCLOR-1232								26829 C	30366						
23 AROCLOR-1242							1871795					634146	24691	461579	11764
24 AROCLOR-1248															
25 AROCLOR-1254															
26 AROCLOR-1260								5400 JC	3902 J						

Results in mg/kg

Subsurface Soils Pest/PCBs

SITE	SITE J	SITE J	SITE K	SITE K	SITE K	BLANK	SITE L	SITE L	SITE L	SITE L	SITE L	SITE M	SITE M	BLANK	SITE P
SAMPLE NUMBER	DC-J2-12	DC-J3-13	DC-K1-08	DC-K2-25	DC-K3-32	DC-LB-01 *	DC-L1-02	DC-L2-03	DC-L3-04	DC-L4-09	DC-L4-10 *	DC-M1-05	DC-M2-06	DC-MB-07 *	DC-P1-53
SAMPLE DEPTH	15'-25'	0-10'	0-10'	0-10'	10'-20'		5'-10'	5'-15'	5'-15'	10'-20'	10'-20'	0-10'	5'-15'		0-10
DATE SAMPLED	12-17-86	12-17-86	12-16-87	1-12-87	1-22-87	12-12-86	12-12-86	12-12-86	12-12-86	12-17-86	12-17-86	12-15-86	12-15-86	12-16-86	2-11-87
1 Alpha-BHC															
2 Beta-BHC															
3 Delta-BHC															
4 Gamma-BHC (Lindane)															
5 Heptachlor															
6 Aldrin															
7 Heptachlor Epoxide															
8 Endosulfan I															
9 Dieldrin															
10 4,4'-DDE															
11 Endrin															
12 Endosulfan II															
13 4,4'-DDD															
14 Endosulfan Sulfate															
15 4,4'-DDT															
16 Methoxychlor															
17 Endrin Ketone															
18 Chlordane															
19 Toxaphene															
20 AROCLOR-1016															
21 AROCLOR-1221															
22 AROCLOR-1232															
23 AROCLOR-1242					19000										
24 AROCLOR-1248			117647 C	4800											
25 AROCLOR-1254															
26 AROCLOR-1260		179		6344											

Subsurface Soils Pest/PCBs

SITE	SITE I	SITE I	SITE I	BLANK	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE J
SAMPLE NUMBER	DC-15-41	DC-15-42	DC-16-43	DC-1D-44	DC-17-45	DC-17-46	DC-17-47 D	DC-19-48	DC-19-49	DC-110-50	DC-111-51	DC-111-52	DC-112-57	DC-112-58	DC-J1-11
SAMPLE DEPTH	5'-27.5'	20'-30'	10'-25'		3.5'-12.5'	13'-23'	13'-23'	6'-23'	24'-30'	15'-30'	6'-20'	26'-39'	3.5'-12.5	10.5'-27.5	1[illegible]-2[illegible]
DATE SAMPLED	1-30-87	1-30-87	2-2-87	2-3-87	2-3-87	2-3-87	2-3-87	2-4-87	2-4-87	2-4-87	2-5-87	2-5-87	2-13-87	2-13-87	12-17-86
1 Alpha-BHC															
2 Beta-BHC															
3 Delta-BHC															
4 Gamma-BHC (Lindane)															
5 Heptachlor															
6 Aldrin															
7 Heptachlor Epoxide															
8 Edosulfan I															
9 Dieldrin															
10 4,4'-DDE															
11 Endrin															
12 Edosulfan II															
13 4,4'-DDD								29694	6602						
14 Endosulfan Sulfate															
15 4,4'-DDT									4305						
16 Methoxychlor															
17 Endrin Ketone															
18 Chlordane															
19 Toxaphene			492000												
20 AROCLOR-1016															
21 AROCLOR-1221															
22 AROCLOR-1232															
23 AROCLOR-1242															
24 AROCLOR-1248															
25 AROCLOR-1254															
26 AROCLOR-1260	342900 J	86140								20400 J					

Subsurface Soils Pest/PCBs

SITE	SITE H	SITE H	SITE H	SITE H	SITE H	SITE H	BLANK	SITE H	SITE H	SITE H	SITE H	SITE H	SITE I	SITE I	SITE I
SAMPLE NUMBER	DC-H1-14	DC-H1-15	DC-H2-16	DC-H3-17	DC-H3-18 *	DC-H4-19	DC-H8-20 *	DC-H5-21	DC-H6-22	DC-H7-23	DC-H8-24	DC-H9-28	DC-I1-38	DC-I2-39	DC-I3-40
SAMPLE DEPTH	15'-25'	35'-50'	5'-20'	10'-20'	10'-20'	10'-25'		0-10'	35'-50'	35'-50'	5'-15'	15'-25'	0-10	5-25	5-15
DATE SAMPLED	12-10-86	12-10-87	1-5-87	1-6-87	1-6-87	1-6-87	1-7-87	1-7-87	1-8-87	1-8-87	1-9-87	1-13-87	1-27-87	1-28-87	1-29-87
1 Alpha-BHC															
2 Beta-BHC															
3 Delta-BHC															
4 Gamma-BHC (Lindane)															
5 Heptachlor															
6 Aldrin															
7 Heptachlor Epoxide															
8 Endosulfan I															
9 Dieldrin															
10 4,4'-DDE								504			700				
11 Endrin															
12 Endosulfan II															
13 4,4'-DDD								431							
14 Endosulfan Sulfate															
15 4,4'-DDT								923			700				
16 Methoxychlor															
17 Endrin Ketone															
18 Chlordane															
19 Toxaphene															
20 AROCLOR-1016															
21 AROCLOR-1221															
22 AROCLOR-1232															
23 AROCLOR-1242															
24 AROCLOR-1248															
25 AROCLOR-1254															
26 AROCLOR-1260	905403	1130 J	139524		251	10000000	205	5166	1755					270000 J	103300

Subsurface Soils Pest/PCBs

SITE	SITE 6	SITE 6	BLANK	SITE 6	SITE 6	SITE 6	BLANK	SITE 6	SITE 6	SITE 6	SITE 6	BLANK	SITE 6	SITE 6	SITE 6
SAMPLE NUMBER	BC-61-26	BC-61-27	BC-60-29 +	BC-62-30	BC-62-31 #	BC-63-33	BC-60-34	BC-64-35	BC-64-36	BC-65-37 #	BC-66-67	BC-60-68 +	BC-67-69	BC-68-70	BC-69-71
SAMPLE DEPTH	0-10'	10'-20'		5'-15'	5'-15'	10'-20'		5'-20'	5'-20	5'-15'	20'-30'		10'-25	10'-20'	35'-40
DATE SAMPLED	1-12-87	1-12-87	1-14-87	1-14-87	1-14-87	1-26-87	1-26-87	1-26-87	1-26-87	1-27-87	2-23-87	2-24-87	2-24-87	2-24-87	2-24-87
1 Alpha-BHC															
2 Beta-BHC															
3 Delta-BHC															
4 Gamma-BHC (Lindane)															
5 Heptachlor															
6 Aldrin															
7 Heptachlor Epoxide															
8 Edosulfan I															
9 Dieldrin															
10 4,4'-DDE				3073	3683						52941		155385 J		
11 Endrin															
12 Edosulfan II															
13 4,4'-DDD															
14 Endosulfan Sulfate															
15 4,4'-DDT															
16 Methoxychlor															
17 Endrin Ketone															
18 Chlordane															
19 Toxaphene															
20 AROCLOR-1016															
21 AROCLOR-1221															
22 AROCLOR-1232															
23 AROCLOR-1242															
24 AROCLOR-1248															174419 C
25 AROCLOR-1254															
26 AROCLOR-1260	130 J						1792 J			57150	764706		661538 J	4420571	267442 C

Subsurface Soils Semivolatiles

SITE	SITE B	SITE B	SITE B	SITE B	SITE B
SAMPLE NUMBER	BC-06-66	BC-09-72	BC-09-73	BC-010-74	BC-010-75
SAMPLE DEPTH	15'-25'	0-10'	15'-20'	5'-10'	10'-15'
DATE SAMPLED	2-18-87	2-26-87	2-26-87	2-26-87	2-26-87
1 Diethyl Phthalate					
2 Acenaphtylene					
3 3-Nitroaniline					
4 Acenaphthene		2561 J			
5 2,4-Dinitrophenol					
6 4-Nitrophenol					
7 Dibenzofuran		1463 J			
8 2,4-Dinitrotoluene					
9 2,6-Dinitrotoluene					
10 Diethylphthalate					
11 4-Chlorophenyl-Phenylether					
12 Fluorene		3049 J			
13 4-Nitroaniline					
14 4,6-Dinitro-2-methylphenol					
15 N-Nitrosodiphenylamine		10244 J			
16 4-Bromophenyl-phenylether					
17 Hexachlorobenzene					
18 Pentachlorophenol		329268	6420 J	112021 J	7159 J
19 Phenanthrene		21951	469 J	42500	863 J
20 Anthracene		4146 J			
21 Di-n-butyl phthalate		7195 J	6049		5000 J
22 Fluoranthene		7317 J		11076 J	
23 Pyrene		62195	1605 J	82051	1477 J
24 Butyl Benzyl phthalate				3846154 E	67045
25 3,3'-Dichlorobenzidine					
26 Benzo(a)Anthracene		25610			
27 bis(2-ethylhexyl) phthalate			914 J		1000 J
28 Chrysene		62195	1605 J	82051	1010 J
29 Di-n-octyl phthalate					
30 Benzo(b)Fluoranthene		17073 J			
31 Benzo(k)Fluoranthene					
32 Benzo(a)Pyrene		19512			
33 Indeno(1,2,3-cd)Pyrene					
34 Benzo(g,h,i)Perylene		17073 J			
35 Dibenz(a,h)Anthracene					

Subsurface Soils Semivolatiles

SITE	SITE H	SITE H	BLANK	SITE P	SITE P	SITE P	SITE P	SITE O	SITE O	SITE O	SITE O	SITE O	SITE O	BLANK
SAMPLE NUMBER	BC-H1-05	BC-H2-06	BC-H0-07 +	BC-P1-53	BC-P2-54	BC-P5-55	BC-P5-56 &	BC-01-59	BC-02-60	BC-03-61	BC-04-62	BC-05-63	BC-05-64 &	BC-00-65 +
SAMPLE DEPTH	0-10'	5'-15'		0-10'	25'-35'	10'-25	10'-25'	15'-25'	20'-30'	10'-20'	0-10'	8.5'-20'	8.5'-20'	
DATE SAMPLED	12-15-86	12-15-86	12-16-86	2-11-87	2-11-87	2-12-87	2-12-87	2-16-87	2-17-87	2-17-87	2-17-87	2-17-87	2-17-67	2-18-87
1 Dimethyl Phthalate														
2 Acenaphtylene														
3 3-Nitroaniline														
4 Acenaphthene														
5 2,4-Dinitrophenol														
6 4-Nitrophenol														
7 Dibenzofuran														
8 2,4-Dinitrotoluene														
9 2,6-Dinitrotoluene														
10 Diethylphthalate														
11 4-Chlorophenyl-Phenylether														
12 Fluorene														
13 4-Nitroaniline														
14 4,6-Dinitro-2-methylphenol														
15 N-Nitrosodiphenylamine											50000 J			
16 4-Bromophenyl-phenylether														
17 Hexachlorobenzene														
18 Pentachlorophenol										22619	474359 J			
19 Phenanthrene	434	203 J									217949	963 J		
20 Anthracene										5357				
21 Di-n-butyl phthalate				16250 J	155 J	63 J	329 J	5207				3700 J		2785 J
22 Fluoranthene	604	253 J									43590 J			
23 Pyrene	553	215 J									202051			
24 Butyl Benzyl phthalate														
25 3,3'-Dichlorobenzidine														
26 Benzo(a)Anthracene	263 J										121795			
27 bis(2-ethylhexyl) phthalate	934	1266					225 J	1379 BJ		1905 BJ			2439 JB	
28 Chrysene	276 J										202051		1951 J	
29 Di-n-octyl phthalate														
30 Benzo(b)Fluoranthene	209 J	152 J									79407 J			
31 Benzo(k)Fluoranthene														
32 Benzo(a)Pyrene	211 J										66667 J			
33 Indeno(1,2,3-cd)Pyrene														
34 Benzo(g,h,i)Perylene											52564 J			
35 Dibenz(a,h)Anthracene														

Subsurface Soils Semivolatiles

SITE	SITE I	SITE I	SITE J	SITE J	SITE J	SITE K	SITE K	SITE K	BLANK	SITE L	SITE L	SITE L	SITE L	SITE L
SAMPLE NUMBER	BC-I12-57	BC-I12-58	BC-J1-11	BC-J2-12	BC-J3-13	BC-K1-08	BC-K2-25	BC-K3-32	BC-LB-01 *	BC-L1-02	BC-L2-03	BC-L3-04	BC-L4-09	BC-L4-10 *
SAMPLE DEPTH	3.5'-12.5'	18.5'-27.5'	10'-20'	15'-25'	0-10'	0-10'	0-10'	10'-20'		5'-10'	5'-15'	5'-15'	10'-20	10'-20'
DATE SAMPLED	2-13-87	2-13-87	12-17-86	12-17-86	12-17-86	12-16-87	1-12-87	1-22-87	12-12-86	12-12-86	12-12-86	12-12-86	12-17-86	12-17-86
1 Dimethyl Phthalate														
2 Acenaphtylene							220 J							
3 3-Nitroaniline														
4 Acenaphthene				2179 J		150 J					44 J			
5 2,4-Dinitrophenol														
6 4-Nitrophenol														
7 Dibenzofuran				1013 J		129 J	104 J							
8 2,4-Dinitrotoluene														
9 2,6-Dinitrotoluene														
10 Diethylphthalate														310 J
11 4-Chlorophenyl-Phenylether														
12 Fluorene				3462 J			195 J							
13 4-Nitroaniline														
14 4,6-Dinitro-2-methylphenol														
15 N-Nitrosodiphenylamine														
16 4-Bromophenyl-phenylether														
17 Hexachlorobenzene														
18 Pentachlorophenol											11530	58220		
19 Phenanthrene				10103		1329 J	1700	559	45 J		602	1772 J		
20 Anthracene				910 J		294 J	415							
21 Di-n-butyl phthalate		134 J					370 BJ	1329 D		171 J	372 J	2704		
22 Fluoranthene						1765 J	2196	1200			440			
23 Pyrene				462 J		1765 J	1342	634			282 J			
24 Butyl Benzyl phthalate														
25 3,3'-Dichlorobenzidine														
26 Benzo(a)Anthracene						941 J	878	332 J				911 J		
27 bis(2-ethylhexyl) phthalate			1027	2949 J	1100	21176 E	1074	4601 D			1217		750	1297
28 Chrysene						1035 J	891	544			205 J			
29 Di-n-octyl phthalate						2941	146 J	302 J						
30 Benzo(b)Fluoranthene						1035	1220	619						
31 Benzo(k)Fluoranthene														
32 Benzo(a)Pyrene						929 J	939	378 J						
33 Indeno(1,2,3-cd)Pyrene							610							
34 Benzo(g,h,i)Perylene							598							
35 Dibenz(a,h)Anthracene														

Subsurface Soils Semivolatiles

	SITE	SITE I	SITE I	SITE I	SITE I	SITE I	BLANK	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I
	SAMPLE NUMBER	BC-12-39	BC-13-40	BC-15-41	BC-15-42	BC-16-43	BC-10-44	BC-17-45	BC-17-46	BC-17-47	BC-19-48	BC-19-49	BC-110-50	BC-111-51	BC-111-52
	SAMPLE DEPTH	5'-25'	5'-15'	5'-27.5'	20'-30'	10'-25'		3.5'-12.5'	13'-23'	13'-23'	6'-23'	20'-30'	15'-30'	6'-20'	26'-39'
	DATE SAMPLED	1-28-87	1-29-87	1-30-87	1-30-87	2-2-87	2-3-87	2-3-87	2-3-87	2-3-87	2-4-87	2-4-87	2-4-87	2-5-87	2-5-87
1	Dimethyl Phthalate														
2	Acenaphtylene														
3	3-Nitroaniline														
4	Acenaphthene					14014									
5	2,4-Dinitrophenol														
6	4-Nitrophenol														
7	Dibenzofuran										5586 J				
8	2,4-Dinitrotoluene														
9	2,6-Dinitrotoluene														
10	Diethylphthalate					16940 J									
11	4-Chlorophenyl-Phenylether														
12	Fluorene					35420 J					6174 J	3075 J			
13	4-Nitroaniline														
14	4,6-Dinitro-2-methylphenol														
15	N-Nitrosodiphenylamine	45900 J		100330 J											
16	4-Bromophenyl-phenylether														
17	Hexachlorobenzene	117450		1270000	177600	32340 J							100800	63460	46800
18	Pentachlorophenol														
19	Phenanthrene			40000 J		101600 J					12495 J				1320 J
20	Anthracene			203200		23100 J									
21	Di-n-butyl phthalate			203200		36960 J	9720	15600	8500	10668		10332			11200
22	Fluoranthene			203200		18400 J									
23	Pyrene			24000 J		49200 J					2205 J				
24	Butyl Benzyl phthalate			139000 J											
25	3,3'-Dichlorobenzidine														
26	Benzo(a)Anthracene												6720 J		
27	bis(2-ethylhexyl) phthalate	31050 J				130900			2375			5535		48430 J	11000
28	Chrysene									5508					
29	Di-n-octyl phthalate														
30	Benzo(b)Fluoranthene					32430 J									
31	Benzo(k)Fluoranthene														
32	Benzo(a)Pyrene														
33	Indeno(1,2,3-cd)Pyrene														
34	Benzo(g,h,i)Perylene														
35	Dibenz(a,h)Anthracene														

Subsurface Soils Semivolatiles

SITE	SITE B	SITE B	SITE B	SITE B	SITE B
SAMPLE NUMBER	BC-06-66	BC-09-72	BC-09-73	BC-010-74	BC-010-75
SAMPLE DEPTH	15'-25'	0-10'	15'-20'	5'-10'	10'-15'
DATE SAMPLED	2-18-87	2-26-87	2-26-87	2-26-87	2-26-87
1 Dimethyl Phthalate					
2 Acenaphtylene					
3 3-Nitroaniline					
4 Acenaphthene		2961 J			
5 2,4-Dinitrophenol					
6 4-Nitrophenol					
7 Dibenzofuran		1463 J			
8 2,4-Dinitrotoluene					
9 2,6-Dinitrotoluene					
10 Diethylphthalate					
11 4-Chlorophenyl-Phenylether					
12 Fluorene		3049 J			
13 4-Nitroaniline					
14 4,6-Dinitro-2-methylphenol					
15 N-Nitrosodiphenylamine		10244 J			
16 4-Bromophenyl-phenylether					
17 Hexachlorobenzene					
18 Pentachlorophenol		329268	6420 J	112821 J	7159 J
19 Phenanthrene		21951	469 J	42300	863 J
20 Anthracene		4146 J			
21 Di-n-butyl phthalate		7195 J	6049		5000 J
22 Fluoranthene		7317 J		11026 J	
23 Pyrene		62195	1605 J	82951	1477 J
24 Butyl Benzyl phthalate				3846154 E	67045
25 3,3'-Dichlorobenzidine					
26 Benzo(a)Anthracene		25610			
27 bis(2-ethylhexyl) phthalate			914 J		1000 J
28 Chrysene		62195	1605 J	82951	1818 J
29 Di-n-octyl phthalate					
30 Benzo(b)Fluoranthene		17073 J			
31 Benzo(k)Fluoranthene					
32 Benzo(a)Pyrene		19512			
33 Indeno(1,2,3-cd)Pyrene					
34 Benzo(g,h,i)Perylene		17073 J			
35 Dibenz(a,h)Anthracene					

Subsurface Soils Semivolatiles

SITE	SITE H	SITE H	BLANK	SITE P	SITE P	SITE P	SITE P	SITE B	SITE B	SITE B	SITE B	SITE B	SITE B	BLANK
SAMPLE NUMBER	BC-H1-05	BC-H2-06	BC-H0-07 *	BC-P1-53	BC-P2-54	BC-P3-55	BC-P3-56 *	BC-B1-59	BC-B2-60	BC-B3-61	BC-B4-62	BC-B5-63	BC-B5-64 *	BC-B0-65 *
SAMPLE DEPTH	0-10'	5'-15'		0-10'	25'-35'	10'-25	10'-25'	15'-25'	20'-30'	10'-20'	0-10'	0.5'-20'	0.5'-20'	
DATE SAMPLED	12-15-86	12-15-86	12-16-86	2-11-87	2-11-87	2-12-87	2-12-87	2-16-87	2-17-87	2-17-87	2-17-87	2-17-87	2-17-67	2-18-67
1 Dimethyl Phthalate														
2 Acenaphtylene														
3 3-Nitroaniline														
4 Acenaphthene														
5 2,4-Dinitrophenol														
6 4-Nitrophenol														
7 Dibenzofuran														
8 2,4-Dinitrotoluene														
9 2,6-Dinitrotoluene														
10 Diethylphthalate														
11 4-Chlorophenyl-Phenylether														
12 Fluorene														
13 4-Nitroaniline														
14 4,6-Dinitro-2-methylphenol														
15 N-Nitrosodiphenylamine											50000 J			
16 4-Bromophenyl-phenylether														
17 Hexachlorobenzene														
18 Pentachlorophenol										22619	474359 J			
19 Phenanthrene	690.	203 J									217909	963 J		
20 Anthracene										5357				
21 Di-n-butyl phthalate				16250 J	155 J	63 J	325 J	5207				3700 J		2785 J
22 Fluoranthene	604	253 J									43590 J			
23 Pyrene	553	215 J									202051			
24 Butyl Benzyl phthalate														
25 3,3'-Dichlorobenzidine														
26 Benzo(a)Anthracene	263 J										121795			
27 bis(2-ethylhexyl) phthalate	934	1266					225 J	1379 BJ		1905 BJ			2439 JB	
28 Chrysene	276 J										202051		1951 J	
29 Di-n-octyl phthalate														
30 Benzo(b)Fluoranthene	209 J	152 J									79407 J			
31 Benzo(k)Fluoranthene														
32 Benzo(a)Pyrene	211 J										66667 J			
33 Indeno(1,2,3-cd)Pyrene														
34 Benzo(g,h,i)Perylene											52564 J			
35 Dibenz(a,h)Anthracene														

Subsurface Soils Semivolatiles

SITE	SITE I	SITE I	SITE J	SITE J	SITE J	SITE K	SITE K	SITE K	BLANK	SITE L	SITE L	SITE L	SITE L	SITE L
SAMPLE NUMBER	BC-I12-57	BC-I12-50	BC-J1-11	BC-J2-12	BC-J3-13	BC-K1-00	BC-K2-25	BC-K3-32	BC-L0-01 +	BC-L1-02	BC-L2-03	BC-L3-04	BC-L4-09	BC-L4-10 B
SAMPLE DEPTH	3.5'-12.5'	18.5'-27.5'	10'-20'	15'-25'	0-10'	0-10'	0-10'	10'-20'		5'-10'	5'-15'	5'-15'	10'-20'	10'-20'
DATE SAMPLED	2-13-07	2-13-07	12-17-06	12-17-06	12-17-06	12-16-07	1-12-07	1-22-07	12-12-06	12-12-06	12-12-06	12-12-06	12-17-06	12-17-06
1 Dimethyl Phthalate														
2 Acenaphthylene							220 J							
3 3-Nitroaniline														
4 Acenaphthene				2179 J		190 J					44 J			
5 2,4-Dinitrophenol														
6 4-Nitrophenol														
7 Dibenzofuran				1013 J		129 J	104 J							
8 2,4-Dinitrotoluene														
9 2,6-Dinitrotoluene														
10 Diethylphthalate														310 J
11 4-Chlorophenyl-Phenylether														
12 Fluorene				3462 J			195 J							
13 4-Nitroaniline														
14 4,6-Dinitro-2-methylphenol														
15 N-Nitrosodiphenylamine														
16 4-Bromophenyl-phenylether														
17 Hexachlorobenzene														
18 Pentachlorophenol											11530	50220		
19 Phenanthrene				14105		1329 J	1700	599	43 J		602	1772 J		
20 Anthracene				910 J		294 J	415							
21 Di-n-butyl phthalate		134 J					370 BJ	1329 B		171 J	372 J	2704		
22 Fluoranthene						1765 J	2196	1200			400			
23 Pyrene				462 J		1765 J	1342	634			202 J			
24 Butyl Benzyl phthalate														
25 3,3'-Dichlorobenzidine														
26 Benzo(a)Anthracene						941 J	870	332 J				911 J		
27 bis(2-ethylhexyl) phthalate			1027	2949 J	1100	21176 E	1074	4601 B			1217		750	1297
28 Chrysene						1035 J	891	544			205 J			
29 Di-n-octyl phthalate						2941	146 J	302 J						
30 Benzo(b)Fluoranthene						1035	1220	619						
31 Benzo(k)Fluoranthene														
32 Benzo(a)Pyrene						929 J	939	370 J						
33 Indeno(1,2,3-cd)Pyrene							610							
34 Benzo(g,h,i)Perylene							598							
35 Dibenz(a,h)Anthracene														

Subsurface Soils Semivolatiles

SITE	SITE I	SITE I	SITE I	SITE I	SITE I	BLANK	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I
SAMPLE NUMBER	BC-12-39	BC-13-40	BC-15-41	BC-15-42	BC-16-43	BC-18-44	BC-17-45	BC-17-46	BC-17-47	BC-19-48	BC-19-49	BC-110-50	BC-111-51	BC-111-52
SAMPLE DEPTH	5'-25'	5'-15'	5'-27.5'	20'-30'	10'-25'		3.5'-12.5'	13'-23'	13'-23'	6'-23'	24'-30'	15'-30'	6'-20'	26'-39'
DATE SAMPLED	1-28-87	1-29-87	1-30-87	1-30-87	2-2-87	2-3-87	2-3-87	2-3-87	2-3-87	2-4-87	2-4-87	2-4-87	2-5-87	2-5-87
1 Dimethyl Phthalate														
2 Acenaphtylene														
3 3-Nitroaniline														
4 Acenaphthene					14014									
5 2,4-Dinitrophenol														
6 4-Nitrophenol														
7 Dibenzofuran										5586 J				
8 2,4-Dinitrotoluene														
9 2,6-Dinitrotoluene														
10 Diethylphthalate					16900 J									
11 4-Chlorophenyl-Phenylether														
12 Fluorene					35420 J					6174 J	3075 J			
13 4-Nitroaniline														
14 4,6-Dinitro-2-methylphenol														
15 N-Nitrosodiphenylamine	45900 J		100330 J											
16 4-Bromophenyl-phenylether														
17 Hexachlorobenzene	117450		1270000	177000	32340 J							100000	63460	46800
18 Pentachlorophenol														
19 Phenanthrene			48000 J		101800 J					12095 J				1520 J
20 Anthracene			203200		23100 J									
21 Di-n-butyl phthalate			203200		34960 J	9720	15600	8500	10660		10332			11200
22 Fluoranthene			203200		18000 J									
23 Pyrene			24600 J		49200 J					2205 J				
24 Butyl Benzyl phthalate			139000 J											
25 3,3'-Dichlorobenzidine														
26 Benzo(a)Anthracene												6720 J		
27 bis(2-ethylhexyl) phthalate	31050 J				130900			2375			5535		40430 J	11000
28 Chrysene									5580					
29 Di-n-octyl phthalate														
30 Benzo(b)Fluoranthene					32430 J									
31 Benzo(k)Fluoranthene														
32 Benzo(a)Pyrene														
33 Indeno(1,2,3-cd)Pyrene														
34 Benzo(g,h,i)Perylene														
35 Dibenz(a,h)Anthracene														

Subsurface Soils Semivolatiles

SITE	SITE B	SITE M	SITE M	SITE M	SITE M	SITE M	SITE M	BLANK	SITE M	SITE M	SITE M	SITE M	SITE M	SITE I
SAMPLE NUMBER	BC-09-71	BC-M1-14	BC-M1-15	BC-M2-16	BC-M3-17	BC-M3-18 *	BC-M4-19	BC-M0-20 *	BC-M5-21	BC-M6-22	BC-M7-23	BC-M8-24	BC-M9-28	BC-11-30
SAMPLE DEPTH	35'-40'	15'-25'	35'-50'	5'-20'	10'-20'	10'-20'	10'-25'		0-10'	35'-50'	35'-50'	5'-15'	15'-25'	0-10'
DATE SAMPLED	2-24-87	12-10-86	12-10-87	1-5-87	1-6-87	1-6-87	1-6-87	1-7-87	1-7-87	1-8-87	1-8-87	1-9-87	1-13-87	1-27-87
1 Dimethyl Phthalate														
2 Acenaphtylene				377500		251 J						130 J		
3 3-Nitroaniline														
4 Acenaphthene	2670 J													
5 2,4-Dinitrophenol	13953 J													
6 4-Nitrophenol														
7 Dibenzofuran	4382 J			600000	205 J	1100						143 J		
8 2,4-Dinitrotoluene														
9 2,6-Dinitrotoluene														
10 Diethylphthalate														
11 4-Chlorophenyl-Phenylether														
12 Fluorene	11279			483200		647						247 J		
13 4-Nitroaniline							1030000 E							
14 4,6-Dinitro-2-methylphenol														
15 N-Nitrosodiphenylamine							6601 J							
16 4-Bromophenyl-phenylether														
17 Hexachlorobenzene			714											
18 Pentachlorophenol														191000
19 Phenanthrene	25581			2110000	256 J	1320			987	47 J		169 J		7946 J
20 Anthracene	8400 J			679500		190 J			221 J			129 J		
21 Di-n-butyl phthalate	17442 BJ			25670 BJ	1152 B	1267 B		1126 B	824 B	870 B	1062 B	1014 B	343 BJ	
22 Fluoranthene				1330000		105 J			972			351 J		8905 J
23 Pyrene	7550 J			664000					935			1209		2877 J
24 Butyl Benzyl phthalate	23256													
25 3,3'-Dichlorobenzidine														
26 Benzo(a)Anthracene				377500					554			1157		2466 J
27 bis(2-ethylhexyl) phthalate						251 J			541		614		305 J	15070
28 Chrysene				332200					750			3380		3973 J
29 Di-n-octyl phthalate														
30 Benzo(b)Fluoranthene				211400					1021			442		1507 J
31 Benzo(k)Fluoranthene														
32 Benzo(a)Pyrene				271800								700		2466 J
33 Indeno(1,2,3-cd)Pyrene				135900										
34 Benzo(g,h,i)Perylene				113250								494		
35 Dibenz(a,h)Anthracene				31710 J										

Subsurface Soils Semivolatiles

SITE	SITE 6	SITE 6	BLANK	SITE 6	SITE 6	SITE 6	BLANK	SITE 6	SITE 6	SITE 6	SITE 6	BLANK	SITE 6	SITE 6
SAMPLE NUMBER	BC-01-26	BC-61-27	BC-00-29 +	BC-62-30	BC-62-31 #	BC-63-33	BC-00-34	BC-64-35	BC-64-36	BC-65-37 #	BC-66-67	BC-00-68 +	BC-67-69	BC-68-70
SAMPLE DEPTH	0-10'	10'-20'		5'-15'	5'-15'	10'-20'		5'-20'	5'-20	5'-15'	20'-30'		10'-25'	10'-20'
DATE SAMPLED	1-12-87	1-12-87	1-14-87	1-14-87	1-14-87	1-26-87	1-26-87	1-26-87	1-26-87	1-27-87	2-23-87	2-24-87	2-24-87	2-24-87
1 Dimethyl Phthalate														
2 Acenaphthylene														
3 3-Nitroaniline														
4 Acenaphthene														
5 2,4-Dinitrophenol														
6 4-Nitrophenol														
7 Dibenzofuran													33046 J	
8 2,4-Dinitrotoluene														
9 2,6-Dinitrotoluene														
10 Diethylphthalate														22037
11 4-Chlorophenyl-Phenylether														
12 Fluorene														
13 4-Nitroaniline														
14 4,6-Dinitro-2-methylphenol														
15 N-Nitrosodiphenylamine										177000				
16 4-Bromophenyl-phenylether														
17 Hexachlorobenzene				40640	27900									
18 Pentachlorophenol				620000 E	990600						23529 J		4769231	185714 J
19 Phenanthrene										26670	12981 J			31429 J
20 Anthracene														
21 Di-n-butyl phthalate	279 BJ	293 BJ	340 BJ								17647 J	10000 B		
22 Fluoranthene											6588 J			
23 Pyrene										19050				
24 Butyl Benzyl phthalate														
25 3,3'-Dichlorobenzidine														
26 Benzo(a)Anthracene														
27 bis(2-ethylhexyl) phthalate														
28 Chrysene										22860				
29 Di-n-octyl phthalate														
30 Benzo(b)Fluoranthene														
31 Benzo(k)Fluoranthene														
32 Benzo(a)Pyrene														
33 Indeno(1,2,3-cd)Pyrene														
34 Benzo(g,h,i)Perylene														
35 Dibenz(a,h)Anthracene														

Subsurface Soils Semivolatiles

SITE	SITE 8	SITE 8	SITE 8	SITE 8	SITE 8
SAMPLE NUMBER	BC-06-66	BC-09-72	BC-09-73	BC-010-74	BC-010-75
SAMPLE DEPTH	15'-25'	0-10'	15'-20'	5'-10'	10'-15'
DATE SAMPLED	2-18-87	2-26-87	2-26-87	2-26-87	2-26-87
1 Phenol					
2 bis(2-Chloroethyl)ether					
3 2-Chlorophenol					
4 1,3-Dichlorobenzene					
5 1,4-Dichlorobenzene		4634 J		112821	
6 Benzyl Alcohol					
7 1,2-Dichlorobenzene		32927		100000	
8 2-Methylphenol					
9 bis(2-Chloroisopropyl) ether					
10 4-Methylphenol					
11 N-Nitroso-n-Dipropylamine					
12 Hexachloroethane					
13 Nitrobenzene					
14 Isophorone					
15 2-Nitrophenol					
16 2,4-Dimethylphenol					
17 Benzoic Acid					
18 bis-(2-Chloroethoxy)methane					
19 2,4-Dichlorophenol					
20 1,2,4-Trichlorobenzene		25610			
21 Naphthalene		6707 J			
22 4-Chloroaniline					
23 Hexachlorobutadiene					
24 4-Chloro-3-methylphenol					
25 2-Methylnaphthalene		31707		7300	
26 Hexachlorocyclopentadiene					
27 2,4,6-Trichlorophenol					
28 2,4,5-Trichlorophenol					
29 2-Chloronaphthalene					
30 2-Nitroaniline					

Subsurface Soils Semivolatiles

SITE	SITE H	SITE H	BLANK	SITE P	SITE P	SITE P	SITE P	SITE O	SITE O	SITE O	SITE O	SITE O	SITE O	BLANK
SAMPLE NUMBER	BC-H1-05	BC-H2-06	BC-HB-07 *	BC-P1-53	BC-P2-54	BC-P3-55	BC-P3-56 *	BC-O1-59	BC-O2-60	BC-O3-61	BC-O4-62	BC-O5-63	BC-O5-64 *	BC-OB-65 *
SAMPLE DEPTH	0-10'	5'-15'		0-10'	25'-35'	10'-25	10'-25'	15'-25'	20'-30'	10'-20'	0-10'	0.5'-20'	0.5'-20'	
DATE SAMPLED	12-15-86	12-15-86	12-16-86	2-11-87	2-11-87	2-12-87	2-12-87	2-16-87	2-17-87	2-17-87	2-17-87	2-17-87	2-17-87	2-18-87
1 Phenol				3075 J										
2 bis(2-Chloroethyl)ether														
3 2-Chlorophenol														
4 1,3-Dichlorobenzene														
5 1,4-Dichlorobenzene				8075 J										
6 Benzyl Alcohol														
7 1,2-Dichlorobenzene				3625 J							24359 J			
8 2-Methylphenol														
9 bis(2-Chloroisopropyl) ether														
10 4-Methylphenol														
11 N-Nitroso-n-Dipropylamine														
12 Hexachloroethane														
13 Nitrobenzene														
14 Isophorone														
15 2-Nitrophenol														
16 2,4-Dimethylphenol														
17 Benzoic Acid														
18 bis-(2-Chloroethoxy)methane														
19 2,4-Dichlorophenol														
20 1,2,4-Trichlorobenzene											26923 J			
21 Naphthalene											34615 J			
22 4-Chloroaniline														
23 Hexachlorobutadiene														
24 4-Chloro-3-methylphenol														
25 2-Methylnaphthalene											160256			
26 Hexachlorocyclopentadiene														
27 2,4,6-Trichlorophenol														
28 2,4,5-Trichlorophenol														
29 2-Chloronaphthalene														
30 2-Nitroaniline														

Subsurface Soils Semivolatiles

SITE	SITE I	SITE I	SITE J	SITE J	SITE J	SITE K	SITE K
SAMPLE NUMBER	BC-I12-57	BC-I12-58	BC-J1-11	BC-J2-12	BC-J3-13	BC-K1-08	BC-K2-25
SAMPLE DEPTH	3.5'-12.5'	18.5'-27.5'	10'-20'	15'-25'	0-10'	0-10'	0-10'
DATE SAMPLED	2-13-87	2-13-87	12-17-86	12-17-86	12-17-86	12-16-87	1-12-87
1 Phenol							
2 bis(2-Chloroethyl)ether							
3 2-Chlorophenol							
4 1,3-Dichlorobenzene							
5 1,4-Dichlorobenzene					211 J		
6 Benzyl Alcohol							
7 1,2-Dichlorobenzene					100 J		
8 2-Methylphenol							
9 bis(2-Chloroisopropyl) ether							
10 4-Methylphenol							
11 N-Nitroso-n-Dipropylamine							
12 Hexachloroethane							
13 Nitrobenzene							
14 Isophorone							
15 2-Nitrophenol							
16 2,4-Dimethylphenol							
17 Benzoic Acid							
18 bis-(2-Chloroethoxy)methane							
19 2,4-Dichlorophenol							
20 1,2,4-Trichlorobenzene						96 J	
21 Naphthalene				17949		153 J	40 J
22 4-Chloroaniline							
23 Hexachlorobutadiene							
24 4-Chloro-3-methylphenol							
25 2-Methylnaphthalene				61538		110 J	
26 Hexachlorocyclopentadiene							
27 2,4,6-Trichlorophenol							
28 2,4,5-Trichlorophenol							
29 2-Chloronaphthalene							
30 2-Nitroaniline							

SITE	SITE K	BLANK	SITE L	SITE L	SITE L	SITE L	SITE L
SAMPLE NUMBER	BC-K3-32	BC-LB-01 *	BC-L1-02	BC-L2-03	BC-L3-04	BC-L4-09	BC-L4-10 *
SAMPLE DEPTH	10'-20'		5'-10'	5'-15'	5'-15'	10'-20'	10'-20'
DATE SAMPLED	1-22-87	12-12-86	12-12-86	12-12-86	12-12-86	12-17-86	12-17-86
1 Phenol				346 J	1519 J		
2 bis(2-Chloroethyl)ether							
3 2-Chlorophenol					2152		
4 1,3-Dichlorobenzene							
5 1,4-Dichlorobenzene					215 J		
6 Benzyl Alcohol							
7 1,2-Dichlorobenzene							
8 2-Methylphenol							
9 bis(2-Chloroisopropyl) ether							
10 4-Methylphenol				88 J	1089 J		
11 N-Nitroso-n-Dipropylamine							
12 Hexachloroethane							
13 Nitrobenzene							49 J
14 Isophorone							
15 2-Nitrophenol							
16 2,4-Dimethylphenol							
17 Benzoic Acid							
18 bis-(2-Chloroethoxy)methane							
19 2,4-Dichlorophenol							
20 1,2,4-Trichlorobenzene							
21 Naphthalene				154 J	532 J		
22 4-Chloroaniline							
23 Hexachlorobutadiene							
24 4-Chloro-3-methylphenol							
25 2-Methylnaphthalene				333 J	1000 J		
26 Hexachlorocyclopentadiene							
27 2,4,6-Trichlorophenol							
28 2,4,5-Trichlorophenol							
29 2-Chloronaphthalene							
30 2-Nitroaniline							

Subsurface Soils Semivolatiles

SITE	SITE I	SITE I	SITE I	SITE I	SITE I	BLANK	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I	SITE I
SAMPLE NUMBER	BC-12-39	BC-13-40	BC-15-41	BC-15-42	BC-16-43	BC-18-44	BC-17-45	BC-17-46	BC-17-47 B	BC-19-48	BC-19-49	BC-110-50	BC-111-51	BC-111-52
SAMPLE DEPTH	5'-25'	5'-15'	5'-27.5'	20'-30'	10'-25'		3.5'-12.5'	13'-23'	13'-23'	6'-23'	24'-30'	15'-30'	6'-20'	26'-39'
DATE SAMPLED	1-28-87	1-29-87	1-30-87	1-30-87	2-2-87	2-3-87	2-3-87	2-3-87	2-3-87	2-4-87	2-4-87	2-4-87	2-5-87	2-5-87
1 Phenol	27000 J				13266 J									
2 bis(2-Chloroethyl)ether														
3 2-Chlorophenol														
4 1,3-Dichlorobenzene	10000 J												70140	
5 1,4-Dichlorobenzene	32400	3666 J	550000	22420	72300								1037000	1596 J
6 Benzyl Alcohol														
7 1,2-Dichlorobenzene	324000	2679 J	139700 J	6490 J	15000 J									
8 2-Methylphenol														
9 bis(2-Chloroisopropyl) ether														
10 4-Methylphenol														
11 N-Nitroso-n-Dipropylamine														
12 Hexachloroethane														
13 Nitrobenzene														
14 Isophorone														
15 2-Nitrophenol														
16 2,4-Dimethylphenol														
17 Benzoic Acid	62100 J													
18 bis-(2-Chloroethoxy)methane														
19 2,4-Dichlorophenol												9000 J		
20 1,2,4-Trichlorobenzene	1403000		8255000 E	637200 E	477400							116400	100200	112000
21 Naphthalene	50050		63500 J	1100 J	44660 J					514500	1845 J			
22 4-Chloroaniline			43100 J											
23 Hexachlorobutadiene														
24 4-Chloro-3-methylphenol														
25 2-Methylnaphthalene	7020 J		50420 J	1700 J	169000					5000 J			23300 J	
26 Hexachlorocyclopentadiene														
27 2,4,6-Trichlorophenol														
28 2,4,5-Trichlorophenol														
29 2-Chloronaphthalene														
30 2-Nitroaniline														

Subsurface Soils Semivolatiles

SITE	SITE B	SITE H	SITE H	SITE H	SITE H	SITE H	SITE H	BLANK	SITE H	SITE H	SITE H	SITE H	SITE H	SITE I
SAMPLE NUMBER	BC-09-71	BC-H1-14	BC-H1-15	BC-H2-16	BC-H3-17	BC-H3-18 @	BC-H4-19	BC-H8-20 *	BC-H5-21	BC-H6-22	BC-H7-23	BC-H8-24	BC-H9-20	BC-11-30
SAMPLE DEPTH	35'-40'	15'-25'	35'-50'	5'-20'	10'-20'	10'-20'	10'-25'		0-10'	35'-50'	35'-50'	5'-15'	15'-25'	0-10'
DATE SAMPLED	2-24-07	12-10-06	12-10-07	1-5-07	1-6-07	1-6-07	1-6-07	1-7-07	1-7-07	1-8-07	1-8-07	1-9-07	1-13-07	1-27-07
1 Phenol						422 J								
2 bis(2-Chloroethyl)ether														
3 2-Chlorophenol														
4 1,3-Dichlorobenzene		241935 J		13200 J			7645 J							
5 1,4-Dichlorobenzene		30645161 E	1190	890000			60110					62 J		10960 J
6 Benzyl Alcohol							7923 J							
7 1,2-Dichlorobenzene		19354839 E	540	90600										8905 J
8 2-Methylphenol														
9 bis(2-Chloroisopropyl) ether														
10 4-Methylphenol						172 J								
11 N-Nitroso-n-Dipropylamine														
12 Hexachloroethane														3014 J
13 Nitrobenzene														
14 Isophorone														
15 2-Nitrophenol														
16 2,4-Dimethylphenol						92 J								
17 Benzoic Acid					1400 J	2640								
18 bis-(2-Chloroethoxy)methane														
19 2,4-Dichlorophenol		741935	167 J		294 J	330 J	8479 J							
20 1,2,4-Trichlorobenzene	15116 J	7580645	4040	211400		145 J	194600			61 J				6713 J
21 Naphthalene	109302			2265000	282 J	1320						44 J		2077 J
22 4-Chloroaniline	8073 J													
23 Hexachlorobutadiene														
24 4-Chloro-3-methylphenol														
25 2-Methylnaphthalene	13953 J			347300		277 J						156 J		3425 J
26 Hexachlorocyclopentadiene														
27 2,4,6-Trichlorophenol		612903	179 J											
28 2,4,5-Trichlorophenol														
29 2-Chloronaphthalene														
30 2-Nitroaniline														

Subsurface Soils Semivolatiles

SITE	SITE 6	SITE 6	BLANK	SITE 6	SITE 6	SITE 6	BLANK	SITE 6	SITE 6	SITE 6	SITE 6	BLANK	SITE 6	SITE 6
SAMPLE NUMBER	BC-01-26	BC-01-27	BC-00-29 *	BC-02-30	BC-02-31 *	BC-03-33	BC-00-34	BC-04-35	BC-04-36	BC-05-37 *	BC-06-67	BC-00-68 *	BC-07-69	BC-08-70
SAMPLE DEPTH	0-10'	10'-20'		5'-15'	5'-15'	10'-20'		5'-20'	5'-20	5'-15'	20'-30'		10'-25'	10'-20'
DATE SAMPLED	1-12-87	1-12-87	1-14-87	1-14-87	1-14-87	1-26-87	1-26-87	1-26-87	1-26-87	1-27-87	2-23-87	2-24-87	2-24-87	2-24-87
1 Phenol										177000				
2 bis(2-Chloroethyl)ether														
3 2-Chlorophenol										8763 J				
4 1,3-Dichlorobenzene														
5 1,4-Dichlorobenzene				3556 J				2376	3750 J					
6 Benzyl Alcohol										6095 J				
7 1,2-Dichlorobenzene														
8 2-Methylphenol										3556 J				
9 bis(2-Chloroisopropyl) ether														
10 4-Methylphenol														
11 N-Nitroso-n-Dipropylamine														
12 Hexachloroethane														
13 Nitrobenzene														
14 Isophorone														
15 2-Nitrophenol														
16 2,4-Dimethylphenol														
17 Benzoic Acid														
18 bis-(2-Chloroethoxy)methane														
19 2,4-Dichlorophenol										38100	14118 J			181929 J
20 1,2,4-Trichlorobenzene										7874 J	103529		120000 J	
21 Naphthalene				4953 J	4026 J					254000	341176		109231 J	5420571
22 4-Chloroaniline										5969 J			239769 J	
23 Hexachlorobutadiene														
24 4-Chloro-3-methylphenol														
25 2-Methylnaphthalene										13970 J	8706 J			37143 J
26 Hexachlorocyclopentadiene														
27 2,4,6-Trichlorophenol										49530				
28 2,4,5-Trichlorophenol														
29 2-Chloronaphthalene														
30 2-Nitroaniline														

APPENDIX E

SUMMARY TABLES FOR SITE-SPECIFIC CONTAMINANT LOADING TO THE MISSISSIPPI RIVER

Table E-1

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW IN SITE G

	Area (ft^2)	Horizontal Flow Rate Q (ft^3/day)	TOCs* Ave. Conc. (ug/L)	Loading to River (lb/day)	Volatiles Ave. Conc. (ug/L)	Loading to River (lb/day)	Carcinogenic PNAs** Ave. Conc. (ug/L)	Loading to River (lb/day)	Non-Carcinogenic PNAs** Ave. Conc. (ug/L)	Loading to River (lb/day)	Total PNAs** Loading to River (lb/day)	Total PCBs Ave. Conc. (ug/L)	Loading to River (lb/day)
January	2,420.90	-13.00	35,129.6	-3.03×10^{-2}	2,906.5	-2.50×10^{-3}	4.75	-4.10×10^{-6}	ND	--	-4.10×10^{-6}	83	-7.16×10^{-5}
February	2,370.00	-14.04	35,129.6	-3.00×10^{-2}	2,906.5	-2.62×10^{-3}	4.75	-4.17×10^{-6}	ND	--	-4.17×10^{-6}	83	-7.20×10^{-5}
March	2,473.61	-9.09	35,129.6	-2.17×10^{-2}	2,906.5	-1.85×10^{-3}	4.75	-2.94×10^{-6}	ND	--	-2.94×10^{-6}	83	-5.13×10^{-5}
April	2,431.51	-6.57	35,129.6	-1.44×10^{-2}	2,906.5	-1.23×10^{-3}	4.75	-1.95×10^{-6}	ND	--	-1.95×10^{-6}	83	-3.41×10^{-5}
May	2,652.55	-3.10	35,129.6	-6.90×10^{-3}	2,906.5	-5.94×10^{-4}	4.75	-9.44×10^{-7}	ND	--	-9.44×10^{-7}	83	-1.65×10^{-5}
June	2,736.76	-4.30	35,129.6	-9.12×10^{-3}	2,906.5	-8.10×10^{-4}	4.75	-1.30×10^{-6}	ND	--	-1.30×10^{-6}	83	-2.27×10^{-5}
July	2,747.29	-8.26	35,129.6	-1.01×10^{-2}	2,906.5	-1.54×10^{-3}	4.75	-2.45×10^{-6}	ND	--	-2.45×10^{-6}	83	-4.27×10^{-5}
August	2,663.00	-13.05	35,129.6	-3.04×10^{-2}	2,906.5	-2.30×10^{-3}	4.75	-4.11×10^{-6}	ND	--	-4.11×10^{-6}	83	-7.10×10^{-5}
September	2,494.66	-17.46	35,129.6	-3.83×10^{-2}	2,906.5	-3.26×10^{-3}	4.75	-5.10×10^{-6}	ND	--	-5.10×10^{-6}	83	-9.06×10^{-5}
October	2,420.90	-16.95	35,129.6	-3.72×10^{-2}	2,906.5	-3.16×10^{-3}	4.75	-5.03×10^{-6}	ND	--	-5.03×10^{-6}	83	-8.79×10^{-5}
November	2,473.61	-12.37	35,129.6	-2.72×10^{-2}	2,906.5	-2.31×10^{-3}	4.75	-3.67×10^{-6}	ND	--	-3.67×10^{-6}	83	-6.42×10^{-5}
December	2,404.14	-11.92	35,129.6	-2.62×10^{-2}	2,906.5	-2.22×10^{-3}	4.75	-3.54×10^{-6}	ND	--	-3.54×10^{-6}	83	-6.18×10^{-5}

* Total organic carbon.

** Polynuclear aromatics.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-2

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW IN SITE B

	Area (ft^2)	Horizontal Flow Rate Q (ft^3/day)	TOCs* Ave. Conc. (ug/L)	Loading to River (lb/day)	Volatiles Ave. Conc. (ug/L)	Loading to River (lb/day)	Carcinogenic PNAs** Ave. Conc. (ug/L)	Loading to River (lb/day)	Non-Carcinogenic PNAs** Ave. Conc. (ug/L)	Loading to River (lb/day)	Total PNAs** Loading to River (lb/day)	Total PCBs Ave. Conc. (ug/L)	Loading to River (lb/day)
January	8,612.86	-0.465	12,270.20	-3.57×10^{-2}	5,981.60	-1.74×10^{-2}	ND	--	3	-8.72×10^{-6}	-8.72×10^{-6}	10.4	-3.02×10^{-5}
February	8,536.10	-0.504	12,270.20	-3.87×10^{-2}	5,981.60	-1.88×10^{-2}	ND	--	3	-9.45×10^{-6}	-9.45×10^{-6}	10.4	-3.28×10^{-5}
March	8,797.10	-0.369	12,270.20	-2.83×10^{-2}	5,981.60	-1.38×10^{-2}	ND	--	3	-6.92×10^{-6}	-6.92×10^{-6}	10.4	-2.40×10^{-5}
April	8,902.16	-0.275	12,270.20	-2.11×10^{-2}	5,981.60	-1.03×10^{-2}	ND	--	3	-3.44×10^{-6}	-3.44×10^{-6}	10.4	-1.79×10^{-5}
May	9,058.09	-0.127	12,270.20	-9.75×10^{-3}	5,981.60	-4.75×10^{-3}	ND	--	3	-2.38×10^{-6}	-2.38×10^{-6}	10.4	-8.26×10^{-6}
June	9,280.38	-0.167	12,270.20	-1.28×10^{-2}	5,981.60	-6.24×10^{-3}	ND	--	3	-3.13×10^{-6}	-3.13×10^{-6}	10.4	-1.09×10^{-5}
July	9,944.73	-0.287	12,270.20	-2.20×10^{-2}	5,981.60	-1.07×10^{-2}	ND	--	3	-5.38×10^{-6}	-5.38×10^{-6}	10.4	-1.87×10^{-5}
August	9,190.21	-0.458	12,270.20	-3.51×10^{-2}	5,981.60	-1.71×10^{-2}	ND	--	3	-8.59×10^{-6}	-8.59×10^{-6}	10.4	-2.98×10^{-5}
September	9,002.74	-0.597	12,270.20	-4.58×10^{-2}	5,981.60	-2.23×10^{-2}	ND	--	3	-1.12×10^{-5}	-1.12×10^{-5}	10.4	-3.88×10^{-5}
October	8,735.69	-0.577	12,270.20	-4.43×10^{-2}	5,981.60	-2.16×10^{-3}	ND	--	3	-1.08×10^{-5}	-1.08×10^{-5}	10.4	-3.75×10^{-5}
November	8,880.21	-0.462	12,270.20	-3.55×10^{-2}	5,981.60	-1.73×10^{-2}	ND	--	3	-8.66×10^{-6}	-8.66×10^{-6}	10.4	-3.00×10^{-5}
December	9,012.03	-0.424	12,270.20	-3.25×10^{-2}	5,981.60	-1.59×10^{-2}	ND	--	3	-7.95×10^{-6}	-7.95×10^{-6}	10.4	-2.76×10^{-5}

* Total organic carbon.

** Polynuclear aromatics.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table 5-3

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW IN SITE I

	Area (ft^2)	Horizontal Flow Rate Q (ft^3/day)	TOCs* Ave. Conc. (ug/L)	Loading to River (lb/day)	Volatiles Ave. Conc. (ug/L)	Loading to River (lb/day)	Carcinogenic PNAs** Ave. Conc. (ug/L)	Loading to River (lb/day)	Non-Carcinogenic PNAs** Ave. Conc. (ug/L)	Loading to River (lb/day)	Total PNAs** Loading to River (lb/day)	Total PCBs Ave. Conc. (ug/L)	Loading to River (lb/day)
January	8,102.99	-0.442	5,736.63	-1.90×10^{-2}	1,204.5	-3.33×10^{-3}	ND	—	3.30	-9.34×10^{-6}	-9.34×10^{-6}	ND	--
February	8,060.17	-0.467	5,736.63	-1.67×10^{-2}	1,204.5	-3.52×10^{-3}	ND	—	3.30	-9.87×10^{-6}	-9.87×10^{-6}	ND	--
March	8,190.34	-0.344	5,736.63	-1.23×10^{-2}	1,204.5	-2.59×10^{-3}	ND	—	3.30	-7.27×10^{-6}	-7.27×10^{-6}	ND	--
April	8,102.99	-0.254	5,736.63	-9.11×10^{-3}	1,204.5	-1.91×10^{-3}	ND	--	3.30	-5.37×10^{-6}	-5.37×10^{-6}	ND	--
May	8,597.51	-0.129	5,736.63	-4.63×10^{-3}	1,204.5	-9.71×10^{-4}	ND	--	3.30	-2.73×10^{-6}	-2.73×10^{-6}	ND	--
June	8,609.62	-0.156	5,736.63	-5.59×10^{-3}	1,204.5	-1.17×10^{-3}	ND	--	3.30	-3.30×10^{-6}	-3.30×10^{-6}	ND	--
July	8,012.45	-0.264	5,736.63	-9.47×10^{-3}	1,204.5	-1.99×10^{-3}	ND	—	3.30	-5.58×10^{-6}	-5.58×10^{-6}	ND	--
August	8,612.86	-0.431	5,736.63	-1.55×10^{-2}	1,204.5	-3.24×10^{-3}	ND	--	3.30	-9.10×10^{-6}	-9.10×10^{-6}	ND	--
September	8,305.00	-0.556	5,736.63	-1.99×10^{-2}	1,204.5	-4.19×10^{-3}	ND	--	3.30	-1.17×10^{-5}	-1.17×10^{-5}	ND	--
October	8,190.34	-0.549	5,736.63	-1.97×10^{-2}	1,204.5	1.97×10^{-2}	ND	--	3.30	-1.16×10^{-5}	-1.16×10^{-5}	ND	--
November	8,229.04	-0.420	5,736.63	-1.51×10^{-2}	1,204.5	-3.16×10^{-3}	ND	--	3.30	-8.87×10^{-6}	-8.87×10^{-6}	ND	--
December	8,459.33	-0.355	5,736.63	-1.27×10^{-2}	1,204.5	-2.67×10^{-3}	ND	—	3.30	-7.50×10^{-6}	-7.50×10^{-6}	ND	--

* Total organic carbon.

** Polynuclear aromatics.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988

Table E-4

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW IN SITE L

	Area (ft^2)	Horizontal Flow Rate Q (ft^3/day)	TOCs* Ave. Conc. (ug/L)	Loading to River (lb/day)	Volatiles Ave. Conc. (ug/L)	Loading to River (lb/day)	Carcinogenic PNAs** Ave. Conc. (ug/L)	Loading to River (lb/day)	Non-Carcinogenic PNAs** Ave. Conc. (ug/L)	Loading to River (lb/day)	Total PNAs** Loading to River (lb/day)	Total PCBs Ave. Conc. (ug/L)	Loading to River (lb/day)
January	2,005.57	-10.83	2,602	-1.76×10^{-3}	1,390	-9.41×10^{-4}	ND	--	ND	--	--	ND	--
February	1,976.40	-11.27	2,602	-1.83×10^{-3}	1,390	-9.79×10^{-4}	ND	--	ND	--	--	ND	--
March	2,022.24	-8.49	2,602	-1.38×10^{-3}	1,390	-7.38×10^{-4}	ND	--	ND	--	--	ND	--
April	1,997.24	-6.39	2,602	-1.04×10^{-3}	1,390	-5.55×10^{-4}	ND	--	ND	--	--	ND	--
May	2,420.05	-3.87	2,602	-6.29×10^{-4}	1,390	-3.36×10^{-4}	ND	--	ND	--	--	ND	--
June	2,226.41	-4.01	2,602	-6.52×10^{-4}	1,390	-3.48×10^{-4}	ND	--	ND	--	--	ND	--
July	2,240.29	-6.72	2,602	-1.09×10^{-3}	1,390	-5.84×10^{-4}	ND	--	ND	--	--	ND	--
August	2,175.02	-10.88	2,602	-1.77×10^{-3}	1,390	-9.45×10^{-4}	ND	--	ND	--	--	ND	--
September	2,000.57	-13.94	2,602	-2.27×10^{-3}	1,390	-1.21×10^{-3}	ND	--	ND	--	--	ND	--
October	2,015.29	-13.50	2,602	-2.20×10^{-3}	1,390	-1.17×10^{-3}	ND	--	ND	--	--	ND	--
November	2,030.57	-10.56	2,602	-1.72×10^{-3}	1,390	-9.17×10^{-4}	ND	--	ND	--	--	ND	--
December	2,044.46	-9.81	2,602	-1.60×10^{-3}	1,390	-8.52×10^{-4}	ND	--	ND	--	--	ND	--

* Total organic carbon

** Polynuclear aromatics.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table 8-5

CONTAMINANT LOADING TO RIVER DUE TO VERTICAL FLOW IN SITE G

	Area (ft^2)	Vertical Flow Rate Q (ft^3/day)	TOCs* Ave. Conc. (ug/L)	Loading to River (lb/day)	Volatiles Ave. Conc. (ug/L)	Loading to River (lb/day)	Carcinogenic PNAs** Ave. Conc. (ug/L)	Loading to River (lb/day)	Non-Carcinogenic PNAs** Ave. Conc. (ug/L)	Loading to River (lb/day)	Total PNAs** Loading to River (lb/day)	Total PCBs Ave. Conc. (ug/L)	Loading to River (lb/day)
January	79,751	8,670.29	35,129	19.00	2,986.5	1.61	4.75	2.57×10^{-3}	ND	--	2.57×10^{-3}	83	4.49×10^{-2}
February	79,751	8,826.04	35,129	19.34	2,986.5	1.64	4.75	2.61×10^{-3}	ND	--	2.61×10^{-3}	83	4.57×10^{-2}
March	79,751	8,826.04	35,129	19.34	2,986.5	1.64	4.75	2.61×10^{-3}	ND	--	2.61×10^{-3}	83	4.57 x 10-2
April	79,751	3,841.93	35,129	8.42	2,986.5	0.72	4.75	1.14×10^{-3}	ND	--	1.14×10^{-3}	83	1.99×10^{-2}
May	79,751	7,787.69	35,129	17.06	2,986.5	1.45	4.75	2.31 x 10-3	ND	--	2.31×10^{-3}	83	4.03×10^{-2}
June	79,751	8,826.04	35,129	19.34	2,986.5	1.64	4.75	2.61×10^{-3}	ND	--	2.61×10^{-3}	83	4.57×10^{-2}
July	79,751	8,386.86	35,129	18.20	2,986.5	1.55	4.75	2.46×10^{-3}	ND	--	2.46×10^{-3}	83	4.30×10^{-2}
August	79,751	6,230.15	35,129	13.65	2,986.5	1.16	4.75	1.85×10^{-3}	ND	--	1.85×10^{-3}	83	3.22×10^{-2}
September	79,751	5,191.79	35,129	11.37	2,986.5	0.97	4.75	1.54×10^{-3}	ND	--	1.54×10^{-3}	83	2.69×10^{-2}
October	79,751	6,749.33	35,129	14.79	2,986.5	1.26	4.75	2.00×10^{-3}	ND	--	2.00×10^{-3}	83	3.49×10^{-2}
November	79,751	8,826.04	35,129	19.34	2,986.5	1.64	4.75	2.61×10^{-3}	ND	--	2.61×10^{-3}	83	4.57×10^{-2}
December	79.751	9,345.22	35,129	20.47	2,986.5	1.74	4.75	2.77×10^{-3}	ND	--	2.77×10^{-3}	83	4.84×10^{-2}

* Total organic carbon.

** Polynuclear aromatics.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-6

CONTAMINANT LOADING TO RIVER DUE TO VERTICAL FLOW IN SITE M

	Area (ft^2)	Vertical Flow Rate Q (ft^3/day)	TOCs* Ave. Conc. (ug/L)	Loading to River (lb/day)	Volatiles Ave. Conc. (ug/L)	Loading to River (lb/day)	Carcinogenic PNAs** Ave. Conc. (ug/L)	Loading to River (lb/day)	Non-Carcinogenic PNAs** Ave. Conc. (ug/L)	Loading to River (lb/day)	Total PNAs** Loading to River (lb/day)	Total PCBs Ave. Conc. (ug/L)	Loading to River (lb/day)
January	116,940	13,696.16	12,270	10.46	5,901.6	5.09	ND	--	3	2.56×10^{-3}	2.56×10^{-3}	10.4	8.06×10^{-3}
February	116,940	14,414.83	12,270	11.04	5,901.6	5.30	ND	--	3	2.70×10^{-3}	2.70×10^{-3}	10.4	9.35×10^{-3}
March	116,940	14,414.83	12,270	11.04	5,901.6	5.30	ND	--	3	2.70×10^{-3}	2.70×10^{-3}	10.4	9.35×10^{-3}
April	116,940	5,007.26	12,270	3.83	5,901.6	1.87	ND	--	3	9.37×10^{-4}	9.37×10^{-4}	10.4	3.25×10^{-3}
May	116,940	10,621.46	12,270	8.13	5,901.6	3.96	ND	--	3	1.99×10^{-3}	1.99×10^{-3}	10.4	6.89×10^{-3}
June	116,940	12,897.40	12,270	9.88	5,901.6	4.81	ND	--	3	2.41×10^{-3}	2.41×10^{-3}	10.4	8.37×10^{-3}
July	116,940	12,897.40	12,270	9.88	5,901.6	4.81	ND	--	3	2.41×10^{-3}	2.41×10^{-3}	10.4	8.37×10^{-3}
August	116,940	11,300.13	12,270	8.71	5,901.6	4.25	ND	--	3	2.13×10^{-3}	2.13×10^{-3}	10.4	7.38×10^{-3}
September	116,940	10,621.46	12,270	8.13	5,901.6	3.96	ND	--	3	1.99×10^{-3}	1.99×10^{-3}	10.4	6.89×10^{-3}
October	116,940	11,300.13	12,270	8.71	5,901.6	4.25	ND	--	3	2.13×10^{-3}	2.13×10^{-3}	10.4	7.38×10^{-3}
November	116,940	12,897.40	12,270	9.88	5,901.6	4.81	ND	--	3	2.41×10^{-3}	2.41×10^{-3}	10.4	8.37×10^{-3}
December	116,940	13,696.16	12,270	10.46	5,901.6	5.09	ND	--	3	2.56×10^{-3}	2.56×10^{-3}	10.4	8.06×10^{-3}

* Total organic carbon.

** Polynuclear aromatics.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-7

CONTAMINANT LOADING TO RIVER DUE TO VERTICAL FLOW IN SITE I

	Area (ft^2)	Vertical Flow Rate Q (ft^3/day)	TOCs* Ave. Conc. (ug/L)	Loading to River (lb/day)	Volatiles Ave. Conc. (ug/L)	Loading to River (lb/day)	Carcinogenic PNAs** Ave. Conc. (ug/L)	Loading to River (lb/day)	Non-Carcinogenic PNAs** Ave. Conc. (ug/L)	Loading to River (lb/day)	Total PNAs** Loading to River (lb/day)	Total PCBs Ave. Conc. (ug/L)	Loading to River (lb/day)
January	164,441	10,190.69	5,736.6	6.31	1,204.5	1.37	ND	--	3.30	3.04×10^{-3}	3.04×10^{-3}	ND	--
February	164,441	10,269.20	5,736.6	6.09	1,204.5	1.45	ND	--	3.30	4.04×10^{-3}	4.06×10^{-3}	ND	--
March	164,441	10,269.20	5,736.6	6.09	1,204.5	1.45	ND	--	3.30	4.06×10^{-3}	4.06×10^{-3}	ND	--
April	164,441	7,600.63	5,736.6	2.72	1,204.5	0.57	ND	--	3.30	1.60×10^{-3}	1.6×10^{-3}	ND	--
May	164,441	14,907.15	5,736.6	5.36	1,204.5	1.13	ND	--	3.30	3.16×10^{-3}	3.16×10^{-3}	ND	--
June	164,441	10,190.69	5,736.6	6.31	1,204.5	1.37	ND	--	3.30	3.04×10^{-3}	3.04×10^{-3}	ND	--
July	164,441	17,120.17	5,736.6	6.13	1,204.5	1.29	ND	--	3.30	3.61×10^{-3}	3.61×10^{-3}	ND	--
August	164,441	14,907.15	5,736.6	5.36	1,204.5	1.13	ND	--	3.30	3.16×10^{-3}	3.16×10^{-3}	ND	--
September	164,441	13,916.64	5,736.6	4.98	1,204.5	1.05	ND	--	3.30	2.93×10^{-3}	2.93×10^{-3}	ND	--
October	164,441	14,907.15	5,736.6	5.36	1,204.5	1.13	ND	--	3.30	3.16×10^{-3}	3.16×10^{-3}	ND	--
November	164,441	10,190.69	5,736.6	6.31	1,204.5	1.37	ND	--	3.30	3.04×10^{-3}	3.04×10^{-3}	ND	--
December	164,441	10,269.20	5,736.6	6.09	1,204.5	1.45	ND	--	3.30	4.06×10^{-3}	4.06×10^{-3}	ND	--

* Total organic carbon.

** Polynuclear aromatics.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table 8-8

CONTAMINANT LOADING TO RIVER DUE TO VERTICAL FLOW IN SITE L

	Area (ft^2)	Vertical Flow Rate Q (ft^3/day)	TOCs* Ave. Conc. (ug/L)	Loading to River (lb/day)	Volatiles Ave. Conc. (ug/L)	Loading to River (lb/day)	Carcinogenic PNAs** Ave. Conc. (ug/L)	Loading to River (lb/day)	Non-Carcinogenic PNAs** Ave. Conc. (ug/L)	Loading to River (lb/day)	Total PNAs** Loading to River (lb/day)	Total PCBs Ave. Conc. (ug/L)	Loading to River (lb/day)
January	25,670.5	2,942.14	2,602	4.77×10^{-1}	1,390	2.55×10^{-1}	ND	--	ND	--	--	ND	--
February	25,670.5	3,176.17	2,602	5.15×10^{-1}	1,390	2.75×10^{-1}	ND	--	ND	--	--	ND	--
March	25,670.5	3,176.17	2,602	5.15×10^{-1}	1,390	2.75×10^{-1}	ND	--	ND	--	--	ND	--
April	25,670.5	1,153.65	2,602	1.07×10^{-1}	1,390	1.00×10^{-1}	ND	--	ND	--	--	ND	--
May	25,670.5	2,340.34	2,602	3.00×10^{-1}	1,390	2.03×10^{-1}	ND	--	ND	--	--	ND	--
June	25,670.5	2,841.84	2,602	4.61×10^{-1}	1,390	2.46×10^{-1}	ND	--	ND	--	--	ND	--
July	25,670.5	2,841.34	2,602	4.61×10^{-1}	1,390	2.46×10^{-1}	ND	--	ND	--	--	ND	--
August	25,670.5	2,340.34	2,602	3.00×10^{-1}	1,390	2.03×10^{-1}	ND	--	ND	--	--	ND	--
September	25,670.5	2,173.17	2,602	3.33×10^{-1}	1,390	1.80×10^{-1}	ND	--	ND	--	--	ND	--
October	25,670.5	2,340.34	2,602	3.00×10^{-1}	1,390	2.03×10^{-1}	ND	--	ND	--	--	ND	--
November	25,670.5	2,841.84	2,602	4.61×10^{-1}	1,300	2.46×10^{-1}	ND	--	ND	--	--	ND	--
December	25,670.5	3,009.00	2,602	4.88×10^{-1}	1,390	2.61×10^{-1}	ND	--	ND	--	--	ND	--

* Total organic carbon.

** Polynuclear aromatics.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-9

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW AT SHALLOW ZONE IN SITE O***

	Area (ft^2)	Flow Rate Q (ft^3/day)	TOCs* Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Volatiles Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Carcinogenic PNAs** Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Non-Carcinogenic PNAs** Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Total PNAs** Loading to River (lb/day)	Total PCBs Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)
January	95,142	-789.69	132,000	-6.51	119,000	-5.87	ND	--	ND	--	--	ND	--
February	94,729	-672.58	132,000	-5.55	119,000	-5.00	ND	--	ND	--	--	ND	--
March	10,260	-122.83	132,000	-1.01	119,000	-0.91	ND	--	ND	--	--	ND	--
April	105,660	358.27	132,000	2.96	119,000	2.67	ND	--	ND	--	--	ND	--
May	111,033	335.50	132,000	2.77	119,000	2.49	ND	--	ND	--	--	ND	--
June	111,370	-44.51	132,000	-0.37	119,000	-0.33	ND	--	ND	--	--	ND	--
July	107,947	-451.70	132,000	-3.73	119,000	-3.36	ND	--	ND	--	--	ND	--
August	99,691	-917.16	132,000	-7.57	119,000	-6.82	ND	--	ND	--	--	ND	--
September	94,128	-1,035.41	132,000	-8.54	119,000	-7.70	ND	--	ND	--	--	ND	--
October	93,113	-875.27	132,000	-7.22	119,000	-6.51	ND	--	ND	--	--	ND	--
November	99,654	-318.89	132,000	-2.63	119,000	-2.37	ND	--	ND	--	--	ND	--
December	100,029	-470.12	132,000	-3.88	119,000	-3.50	ND	--	ND	--	--	ND	--

* Total Organic Carbon.

** Polynuclear aromatics.

*** Data from monitoring wells EE-21, EE-22, EE-23, and EE-24 were used to calculate weighted average concentrations.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table 8-10

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW AT INTERMEDIATE ZONE IN SITE O***

	Area (ft^2)	Flow Rate Q (ft^3/day)	TOCs* Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Volatiles Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Carcinogenic PNAs** Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Non-Carcinogenic PNAs** Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Total PNAs** Loading to River (lb/day)	Total PCBs Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)
January	52,363	-434.62	100	-0.00259	71	-0.001917	ND	--	ND	--	--	ND	--
February	52,363	-371.70	100	-0.0023	71	-0.00165	ND	--	ND	--	--	ND	--
March	52,363	-62.03	100	-0.00039	71	-0.00028	ND	--	ND	--	--	ND	--
April	52,363	178.03	100	0.00111	71	+0.00079	ND	--	ND	--	--	ND	--
May	52,363	157.09	100	0.00098	71	+0.000697	ND	--	ND	--	--	ND	--
June	52,363	-20.95	100	-0.00013	71	-0.000093	ND	--	ND	--	--	ND	--
July	52,363	-219.93	100	-0.00137	71	-0.000976	ND	--	ND	--	--	ND	--
August	52,363	-481.75	100	-0.003	71	-0.00214	ND	--	ND	--	--	ND	--
September	52,363	-576.00	100	-0.0036	71	-0.00256	ND	--	ND	--	--	ND	--
October	52,363	-492.22	100	-0.0031	71	-0.00218	ND	--	ND	--	--	ND	--
November	52,363	-167.57	100	-0.00104	71	-0.00074	ND	--	ND	--	--	ND	--
December	52,363	-246.10	100	-0.00154	71	-0.00109	ND	--	ND	--	--	ND	--

* Total organic carbon.

** Polynuclear aromatics.

*** Data from monitoring wells GM193 and GM208 (Geraghty & Miller 1986; 1986a) were used to calculate weighted average calculations.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-11

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW AT SHALLOW ZONE IN SITE Q***

	Area (ft^2)	Flow Rate Q (ft^3/day)	TOCs* Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Volatiles Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Carcinogenic PNAs** Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Non-Carcinogenic PNAs** Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Total PNAs** Loading to River (lb/day)	Total PCBs Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)
January	105,370	-1,369.32	235	-0.02011	130	-0.01112	ND	--	ND	--	--	ND	--
February	109,001	-867.42	235	-0.0127	130	-0.00700	ND	--	ND	--	--	ND	--
March	135,036	783.21	235	0.0115	130	0.00636	ND	--	ND	--	--	ND	--
April	146,401	1,551.05	235	0.0228	130	0.01261	ND	--	ND	--	--	ND	--
May	150,703	889.62	235	0.01307	130	0.00723	ND	--	ND	--	--	ND	--
June	140,015	-267.55	235	-0.00393	130	-0.00217	ND	--	ND	--	--	ND	--
July	129,257	-930.65	235	-0.01367	130	-0.00756	ND	--	ND	--	--	ND	--
August	108,549	-1,639.10	235	-0.0241	130	-0.01330	ND	--	ND	--	--	ND	--
September	99,130	-1,556.70	235	-0.0229	130	-0.01265	ND	--	ND	--	--	ND	--
October	103,733	-1,130.60	235	-0.0166	130	-0.00920	ND	--	ND	--	--	ND	--
November	120,390	372.3	235	0.0055	130	0.00300	ND	--	ND	--	--	ND	--
December	121,359	-594.61	235	-0.0087	130	-0.00483	ND	--	ND	--	--	ND	--

* Total organic carbon.

** Polynuclear aromatics.

*** Data from monitoring wells EE-09, EE-10, and EE-06 were used to calculate weighted average concentrations.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-12

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW AT SHALLOW ZONE IN SITE D***

	Area (ft^2)	Flow Rate Q (ft^3/day)	TOCs* Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Volatiles Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Carcinogenic PNAs** Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Non-Carcinogenic PNAs** Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Total PNAs** Loading to River (lb/day)	Total PCBs Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)
January	52,293	-852.30	12,510	-0.67	1,555	-0.083	ND	--	ND	--	--	ND	--
February	54,492	-403.35	12,510	-0.31	1,555	-0.039	ND	--	ND	--	--	ND	--
March	67,015	737.17	12,510	0.58	1,555	0.072	ND	--	ND	--	--	ND	--
April	72,656	1,080.00	12,510	0.84	1,555	0.1038	ND	--	ND	--	--	ND	--
May	74,031	471.43	12,510	0.37	1,555	0.046	ND	--	ND	--	--	ND	--
June	69,003	-230.50	12,510	-0.18	1,555	-0.022	ND	--	ND	--	--	ND	--
July	64,140	-641.40	12,510	-0.50	1,555	-0.062	ND	--	ND	--	--	ND	--
August	53,071	-953.50	12,510	-0.75	1,555	-0.093	ND	--	ND	--	--	ND	--
September	49,210	-536.40	12,510	-0.42	1,555	-0.052	ND	--	ND	--	--	ND	--
October	51,400	-561.16	12,510	-0.44	1,555	-0.054	ND	--	ND	--	--	ND	--
November	63,717	523.47	12,510	0.41	1,555	0.051	ND	--	ND	--	--	ND	--
December	60,229	-361.37	12,510	-0.28	1,555	-0.035	ND	--	ND	--	--	ND	--

* Total Organic Carbon.

** Polynuclear Aromatics.

*** Data from monitoring wells P-1, P-7, P-11, D-26A, and D-28A (Geraghty & Miller 1986; 1986a) were used to calculate weighted average concentrations.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-13

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW AT INTERMEDIATE ZONE IN SITE B***

	Area (ft^2)	Flow Rate Q (ft^3/day)	TOCs* Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Volatiles Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Carcinogenic PNA** Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Non-Carcinogenic PNAs** Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)	Total PNAs** Loading to River (lb/day)	Total PCBs Weighted Ave. Conc. (ug/L)	Loading to River (lb/day)
January	107,700	-74,313	8,990	-41.79	4,440	-20.62	ND	--	ND	--	--	ND	--
February	107,700	-23,694	8,990	-13.32	4,440	-6.57	ND	--	ND	--	--	ND	--
March	107,700	62,466	8,990	35.13	4,440	17.33	ND	--	ND	--	--	ND	--
April	107,700	70,543	8,990	39.67	4,440	19.57	ND	--	ND	--	--	ND	--
May	107,700	30,040	8,990	16.90	4,440	8.34	ND	--	ND	--	--	ND	--
June	107,700	-17,771	8,990	-9.99	4,440	-4.93	ND	--	ND	--	--	ND	--
July	107,700	-42,003	8,990	-23.62	4,440	-11.66	ND	--	ND	--	--	ND	--
August	107,700	-81,852	8,990	-46.03	4,440	-22.71	ND	--	ND	--	--	ND	--
September	107,700	-85,621	8,990	-48.15	4,440	-23.76	ND	--	ND	--	--	ND	--
October	107,700	-37,196	8,990	-20.89	4,440	-10.31	ND	--	ND	--	--	ND	--
November	107,700	48,465	8,990	27.25	4,440	13.45	ND	--	ND	--	--	ND	--
December	107,700	-21,540	8,990	-12.11	4,440	-5.98	ND	--	ND	--	--	ND	--

* Total Organic Carbon.

** Polynuclear Aromatics.

*** Data from monitoring wells GM27D and GM20D (Geraghty & Miller 1986; 1986a) were used to calculate weighted average concentrations.

ND Not Detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

NAPHTHALENE

Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of naphthalene (CAS No. 91-20-3) are summarized below (EPA 1984).

Molecular Weight (g/mole)	128
Water Solubility (mg/L at 25°C)	31.7
Vapor Pressure (mmHg at 25°C)	0.082
Henry's Law Constant (atm-m^3/mole)	no data found
Log K_{ow}	3.37
K_{oc}	no data found
BCF	1.46

Naphthalene has a moderate water solubility and moderate vapor pressure. As a consequence of these two properties, benzene can be characterized as a moderately mobile chemical. For naphthalene release to air, some rainwater washout is anticipated. After deposition in water or soil, volatilization is expected to return some portion back to the atmosphere.

Due to its moderate water solubility and moderate vapor pressure, transport to sediments is expected to be a major surface water fate process.

Naphthalene released to soil can be transported to air via volatilization, to surface water via runoff, and to groundwater via leaching. The first two pathways predominate in surficial soil, whereas the latter pathway predominates at lower soil depths.

Noncarcinogenic Effects

Exposure to naphthalene by the ingestion, inhalation and dermal routes has been reported to result in intravascular hemolysis, corneal ulceration and cataracts, eye irritation, headache, confusion, malaise, nausea, vomiting, and bladder irritation in humans. In severe cases hemolytic anemia with associated jaundice and occasionally renal disease and death have been reported. Individuals with a deficiency of glucose-6-phosphate dehydrogenase (G6PD) and infants appear to be at greater risk for developing hemolytic anemia.

In a study recently reported by Shopp et al. (1984) male and female CD-1 mice were exposed for 14 or 90 day by gavage to 3 different doses of the compound. Both males and females showed a 5-10% mortality and depressed body weights at the high dose of 133 mg/kg/day. At this dose the males had decreased thymus weights and the females had decreased spleen and increased lung weights. No toxic effects were observed at the two lower doses of 53 mg/kg/day and 27 mg/kg/day. For all exposure groups, no alterations were observed in the hepatic drug metabolizing system except for a dose-related inhibition of aryl hydrocarbon hydroxylase (AHH) activity.

Harris and coworkers (1970 as reported in USEPA 1982) reported a statistically significant increase in retarded cranial ossification and heart development in offspring of Sprague Dawley dams that had received intraperitoneal injections of 395 mg/kg naphthalene on days 1-15 of gestation. In a recent study by Plasterer and coworkers (1985) single doses of naphthalene were administered by gavage to pregnant CD-1 mice on days 7 through 14 of pregnancy. The compound was given at a dose estimated to be at or just below the threshold of adult lethality. A significant reduction in the average number of live pups per litter was reported for the naphthalene-dosed females.

Carcinogenicity and Mutagenicity

Overall, the results of carcinogenicity testing with napthalene have been negative. Knake (1956 as reported in USEPA 1980) treated 40 white rats with 500 mg/kg of coal tar naphthalene in sesame oil subcutaneously every two weeks for a total of seven treatments. Five out of thirty-four rats developed invasive or metastatic lymphosarcoma prior to death. These result are equivocal, however, because the injection sites were first painted with carbolfuchsin (a known carcinogen) prior to each injection. The naphthalene also contained approximately 10% methylnaphthalene.

In a second study, Knake (1956 as reported in USEPA 1980) painted a group of mice with either benzene or a solution of coal tar naphthalene in benzene and noted an excess of lymphatic leukemia in the group treated with the napthalene/benzene solution as compared to those treated with benzene alone (4 vs. 0 cases, respectively). These results are difficult to interpret because benzene is a known animal carcinogen.

Naphthalene when combined with rat microsomal fractions has been found to be nonmutagenic in bacterial mutagenesis assays (EPA 1980).

Drinking Water Standards and Criteria

EPA has not developed any drinking water standards or health advisories or ambient water quality criteria for human health for napthalene.

NICKEL

Environmental Chemistry and Fate

In the atmosphere, nickel exists predominantly as an aerosol. Atmospheric residence times depend on the nickel concentrations, the density and size of particles, and precipitation. The typical residence times of nickel in the atmosphere ranges from 1 to 21 days. Nickel species in the air most likely include soil minerals, oxide, and sulfates.

Depending on the chemical and physical properties of the water, nicekl exists in numerous soluble and insoluble forms in aqueous systems. Due to precipitation, iron oxide and manganese oxide are the primary determinants of the aqueous mobility of nickel. However, variation of other factors such as sulfate concentration and pH can significantly influence nickel's mobility.

Nickel is persistent in soils and has the potential to leach to groundwater. Sorption of nickel to soil is dependent on soil-water pH, total iron and surface area. Organic complexing agents in soil tend to restrict nickel movement due to formation of organo-nickel complexes. Nickel may also be immobilized as nickel ferrite, as other more common compounds (e.g., carbonates, sulfates, or halides) are too soluble to precipitate out of soil-water.

Nickel is moderately mobile in low pH and high cation-exchange capacity soils, but less mobile in mineral soils and soils with high organic content (ATSDR 1987j). Extractability of nickel from soil effects uptake by plant roots. The extractability is influenced by a number of complex physical, chemical, and biological factors.

Nickel is bioconcentrated in some aquatic organisms. Bioconcentration factors typically range from 20-1,000, with higher values for phytoplankton, algae, and seaweed.

Noncarcinogenic Effects

Laboratory studies in animals have demonstrated depressed body weight gain, alterations in hematology parameters, cytochrome oxidase activity, and iron contents of organs following high oral nickel exposure.

Studies evaluating the effects of nickel administration on animal reproductive systems have produced varying results. Nickel is known to cross the placental barrier in animals, and some data suggest this is also true for humans. Intraperitoneal and intravenous injections of nickel compounds have produced some tetratogenic effects in animals. Increased fetal mortality and reduced fetal weights also were observed. In some studies, high dosages resulted in reduced fetal survival and decreased fetal weights in the absence of frank teratogenesis.

Feeding studies involving administration of various nickel compounds to rats are more applicable to human exposure situations. Various studies have reported a correlation between nickel concentration in food or water and reproductive performance (ATSDR, 1987b). Nickel exposure has also been reported to impair male gametogenesis in mice and rats. No adverse reproductive effects linked to nickel exposure have been reported in humans.

Carcinogenicity and Mutagenicity

The chemical form and route of exposure may be important factors in determining the carcinogenic potential of nickel. Insoluble nickel compounds (e.g., metallic nickel, nickel subsulfide, and nickel carbonyl) have been shown to produce tumors following inhalation exposure. However, multiple studies in which nickel was administered orally to rats and mice have been uniformly negative (EPA 1985c). In humans, excess respiratory cancer mortality has been demonstrated in epidemiological studies of nickel smelting and refining workers.

EPA has classified nickel in group B_2--sufficient evidence for carcinogenicity in animals, limited evidence in humans--according to guidelines for carcinogenic risk assessment (EPA, 1986b) for the inhalation route, based upon the positive animal evidence for nickel subsulfide and carbonyl compounds. However, reflecting the negative animal carcinogenicity data, the Agency has categorized nickel in Group D - inadequate evidence for the oral route of exposure.

Nickel chloride was not mutagenic, whereas nickel sulfate was found to be mutagenic in *in vitro* assays.

Drinking Water Standards

There is no federal drinking water standard for nickel. EPA, however, has established a lifetime drinking water health advisory of 150 ug/L (EPA 1985c).

PENTACHLOROPHENOL (PCP)

Introduction

Commercial pentachlorophenol (PCP) is contaminanted with two chemicals - hexachlorobenzene (HCB), and hexachlorodibenzo-p-dioxin (HxCDD) which are currently categorized by EPA in its category B_2 as probable human carcinogens. Both are also potential reproductive toxins. PCP is also contaminated with polychlorinated dibenzofurans. This profile primarily addresses the toxicity of commercial PCP. The reader is referred to the profiles for HCB, HxCDD, and dibenzofurans for further information relevant to evaluating the potential toxicity of commercial PCP.

Environmental Chemistry and Fate

The relevant physical and chemical properties for pentachlorophenol (CAS No. 87-86-5) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	266
Water Solubility (mg/L at 25°C)	14
Vapor Pressure (mmHg at 25°C)	1.1×10^{-4}
Henry's Law Constant (atm-m^3/mole)	2.8×10^{-6}
Log K_{ow}	5
K_{oc}	53,000
BCF	770

Pentachlorophenol (PCP) has a moderate water solubility, low vapor pressure, low Henry's Law Constant, and high K_{oc}. Based upon its K_{oc} and low vapor pressure, PCB would be strongly bound to surface soil. The K_{oc} of 53,000 indicates that leaching from soils and transport to groundwater is a slow process. PCP is resistant to biodegradation. The low Henry's Law Constant and high K_{oc} indicate that PCP will be strongly partitioned to surface water sediments. Finally, the BCF indicates that, like many lipophilic organics, PCP will bioconcentrate in aquatic life.

Noncarcinogenic Effects

PCP has elicited a wide variety of symptoms following subchronic oral administration in animals, including: secondary anemia, increased blood sugar levels, hemorrhages and congestion in the lungs and kidneys, degenerative changes in the kidney tubules, and lesions of the brain and spinal cord (EPA 1985n). Commercial PCP containing chlorinated dibenzo-p-dioxins and dibenzofurans are significantly more toxic than the purified pentachlorophenol used in subchronic animal studies.

In humans, local irritation, allergic responses, and systemic effects are found. Pentachlorophenol poisoning is characterized by profuse sweating, accompanied by fever, weight loss, and gastrointestinal distress. Occupational epidemiological studies have revealed an increased incidence of low-grade infections or inflammations, and depression of kidney functions, which are partially reversible (EPA 1985h).

Reproduction and Development

Pentachlorophenol has not been shown to be teratogenic in any of the many animal studies designed to assess the toxicological endpoint.

Fetoxicity has been elicited by both purified and commercial PCP, with the effects probably secondary to maternal toxicity. Fetotoxic effects noted in rat studies include increases in resorptions, alterations in the sex ratio, and a number of skeletal anomalies regarded by the investigators as indicative of fetotoxicity rather than teratogenicity. EPA has developed a NOEL of 3 mg/kg/day (EPA 1987g) based on a one-generation rat study.

HxCDD, an important contaminant in commercial PCP, has elicited both fetotoxicity and teratogenicity in rat studies. Teratogenic effects observed include cleft palate, dilated renal pelvis, and abnormal vertebrae. EPA has derived a NOEL of 0.1 ug/kg/day for fetotoxicity (EPA 1987g), which is lower than the NOEL for teratogenicity.

HCB, another important contaminant of commercial PCP, has elicited fetotoxicity and teratogenicity in rodent studies. Abnormalities observed in fetuses include cleft palate, reduced fetal viability, reduced neonatal weight gain, and reduced relative neonatal weight. Based on these studies, EPA set the NOEL for HCB at 1.0 mg/kg/day (EPA 1987g).

Carcinogenicity and Mutagenicity

Pure pentachlorophenol has not been reported to be carcinogenic in a number of animal studies (EPA 1987g). It has also produced negative results in an initiation/promotion study. These results are consistent with mutagenicity studies which have primarily been negative (EPA 1987g).

However, HxCDD and HCB have both been found to be oncogenic in animal studies (EPA 1987g). The EPA estimated 95% upper bound carcinogenic potencies of 6.2×10^3 and 1.67 mg/kg/day, for HxCDD and HCB, respectively (EPA 1986a, EPA 1987g).

Drinking Water Standards and Criteria

EPA has issued no drinking water standards for PCP, HCB, or HxCDD. EPA has issued a proposed MCLG for PCP of 200 ug/L, based upon a DWEL of 1.01 mg/L, and assuming a drinking water contribution of 20% to total daily PCP intake (EPA 1985a).

EPA has developed health advisories for a 10 kg child and a 70 kg adult for PCP and HCB, but not for HxCDD. The EPA health advisory limits and reference concentrations for potential carcinogens for PCP and its major contaminants are summarized in the following table.

	One-day 10 kg	Ten-day 10 kg	Long term 10 kg	Long term 70 kg	Lifetime 70 kg	Reference Concentration*
Pentachlorophenol	1000	300	300	1050	1050	--
Hexachlorobenzene	50	50	50	175	--	0.02
HxCDD	--	--	--	--	--	--
Dibenzofurans	--	--	--	--	--	--

Source: EPA, 1986a

- No limit developed.

* Corresponding to a 1×10^{-6} cancer risk.

All concentrations in ug/L.

Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of phenol (CAS No. 108-95-2) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	94
Water Solubility (mg/L at 25°C)	93,000
Vapor Pressure (mmHg at 25°C)	0.341
Henry's Law Constant ($atm\text{-}m^3/mole$)	4.5×10^{-7}
Log K_{ow}	1.42
K_{oc}	14.2
BCF	14

Phenol has a high water solubility and vapor pressure. As a consequence of these two properties, phenol can be characterized as a highly mobile chemical. For phenol released to air, some rainwater washout is anticipated. After deposition in water or soil, volatilization is expected to return some portion back to the atmosphere. Based on its low Henry's Law Constant, substantial volatilization loss should not occur to the atmosphere following release to water.

Due to its high water solubility and high vapor pressure, transport to sediments is not expected to be a major surface water fate process.

Phenol released to soil can be transported to air via volatilization, to surface water via runoff, and to groundwater via leaching. The first two pathways predominate in surficial soil, whereas the latter pathway predominates at lower soil depths.

According to criteria developed by Kenaga (1980), phenol with a K_{oc} of 14.2 would be considered to be mobile in soils. Other factors which influence soil mobility include soil type, the amount of rainfall, the depth to groundwater, and the extent of degradation.

Noncarcinogenic Effects

Phenol is a highly toxic compound that may enter the body via skin absorption, vapor inhalation, and ingestion. Based on the available human and animal data, exposure to large doses by any route of exposure can lead to serious illness or death. Toxic doses in human and species exhibit similar symptoms: initial increases in heart rate, labored breathing, cyanosis, and pulmonary edema. The present data do not indicate that phenol to be teratogenic.

Carcinogenicity and Mutagenicity

Based upon the limited animal data, the EPA has classified phenol in category D - inadequate evidence to evaluate carcinogenicity.

The mutagenicity data are equivocal presenting on balance, equivocal evidence of mutagenicity.

Drinking Water Standards and Criteria

EPA has not classified drinking water standards or criteria for phenol.

POLYCHLORINATED BIPHENYLS (PCB)

Introduction

Polychlorinated biphenyls (PCBs) are a class of compounds with varying degrees of chlorine substitution on two phenyl rings bound at the 1-1' position. PCBs, previously used in commerce, are mixtures of various substituted biphenyls formed by a reaction of chlorine with biphenyl. Because of their heat stability and resistance, low water solubility, and favorable dielectric properties, PCBs found considerable use in hydraulic fluids, compressor lubricants, heat transfer fluids, paints, lacquers, and ink (EPA 1987f).

PCBs have the empirical formula $C_{12}H_{10-n}Cl_n$ with n=1 to 10. The numbering system is based upon ring-ring chlorine bonds, with identical numbering systems on each ring. By convention, the ring with the fewest chlorine substitutes, or substituted in the highest numerical positions, is designated as prime (ATSDR, 1987l).

Individual PCB registered trademarks or brand names vary according to both the manufacturer and the country of origin.

PCBs, formerly produced in the United States by a single manufacturer, are called Aroclors. All Aroclors are designated by a four-digit numbering system. The first two digits denote the type of compound; the last two digits give the percentage by weight of chlorine. The only exception is Aroclor 1016. The trademarks by manufacturers in other countries include Phenoclor, Clophen, and Kaneclor.

Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fates of polychlorinated biphenyls are summarized in Table 1 (ATSDR 1987l).

In water, adsorption to sediments or other organic water is a major fate process for PCBs (EPA 1987l). Based on their water solubilities and octanol-water partition coefficients, the lower chlorinated components of the Aroclors will sorb less strongly than the higher chlorinated isomers.

Volatilization is also an important environmental fate process for PCBs dissolved in natural water. The estimated Henry's Law Constants

Table 1

PHYSICAL AND CHEMICAL PROPERTIES OF PCBs*

Aroclor Designation	Molecular Weight (average)	Color	Physical State	Solubility water, mg/L	Density g/cm^3 at 25°C	Partition Coefficient Log Octanol-Water*	Vapor Pressure (mm Hg at 25°C)	Henry's Law** Constant $atm\text{-}m^3/mol$ at 25°C	Biocentration Factor***
1016	257.9	Clear	Oil	0.42	1.33	5.6	4×10^{-4}	2.9×10^{-4}	42,500
1221	200.7	Clear	Oil	0.59 (24°C)	1.15	4.7	6.7×10^{-3}	3.5×10^{-3}	
1232	232.2	Clear	Oil	Unknown	1.24	5.1	4.06×10^{-3}	Unknown	
1242	266.5	Clear	Oil	0.24	1.35	5.6	4.06×10^{-4}	5.2×10^{-4}	
1248	299.5	Clear	Oil	0.054	1.41	6.2	4.94×10^{-4}	2.8×10^{-3}	70,500
1254	328.4	Lt. Yellow	Viscous liquid	0.012	1.50	6.5	7.71×10^{-5}	2.8×10^{-3}	100,000
1260	375.7	Lt. Yellow	Sticky resin	0.0027	1.58	6.8	4.05×10^{-5}	4.6×10^{-3}	190,000

* These log Kow values represent an average value for the major components of the individual Aroclor.

** Henry's Law constants were estimated by dividing the vapor pressure by the water solubilities, and represent average values for the Aroclor mixtures as a whole (ATSDR 1987r).

*** From Lyman, Reehl, and Rosenbladt (1982).

Source: Unless otherwise specified, from ATSDR (1987l).

are indicative of significant volatilization from environmental waters (ATSDR 19871). However, strong adsorption to sediments significantly reduces the concentrations of PCBs available for volatilization, with longer volatilization half-lives for the higher chlorinated PCBs.

The low water solubility, high log K_{ow}s, and demonstrated strong adsorption to soils and sediments indicate that significant leaching should not occur in soil under most conditions. Lower chlorinated PCBs will leach at rates greater than the higher chlorinated PCBs. In the presence of organic solvents, significant leaching of PCBs in soil can occur (ATSDR 19871).

PCBs with vapor pressures ranging from 10^{-3} to 10^{-5} mm Hg should exist almost entirely in the vapor phase in the atmosphere (Eisenreich et al, 1981). The tendency of PCBs to adsorb to particulates increases with increasing degree of chlorination. PCBs in the atmosphere are physically removed by wet and dry deposition (Eisenreich et al, 1981).

In general, the rate of degradation or transformation in the environment decreases with increasing chlorination. In the atmosphere, the vapor phase reaction of PCBs with hydroxyl radicals may be the dominant transformation process (ATSDR 19871). In the aquatic environment PCBs are not significantly degraded by hydrolysis and oxidation, and photolysis appears to be the only potentially important process (ATSDR 19871).

In general, mono-, di-, and trichlorinated biphenyls (Aroclor 1221 and 1232) biodegrade relatively rapidly; tetrachlorinated biphenyls (Aroclors 1016 and 1242) biodegrade slowly; and higher chlorinated biphenyls (Aroclors 1248, 1254 and 1260) are resistant to biodegradation (ATSDR 19871). In addition to the degree of chlorination, chlorine substitution patterns also appear to be important in influencing the rate of biodegradation.

Experimentally determined bioconcentration factors (BCFs) for various Aroclors (1016, 1248, 1254, and 1260) in aquatic species (fish, shrimp, oyster) range from 26,000 to 660,000 (Leifer et al, 1983).

Noncarcingenic Effects

Several complications exist in assessing the toxicity of PCBs. Different mixtures nominally depicted by PCB type and chlorine substitution may, in fact, vary significantly in isomer composition. Additionally, highly toxic contaminants are often present in PCB mixtures.

In general, however, it can be concluded that short and intermediate-term studies of toxicological effects following oral administration of PCBs to animals result in a variety of physiological and morphological alterations in the liver, including: enlargement, fatty infiltration, centrilobular lesions, and effects on liver porphyrin metabolism. The major biochemical effects include induction of mixed function oxidase enzymes and modification of porphyrin metabolism. PCBs can also inhibit the immune system. Skin applications to rabbits has been shown to cause erythema, keratosis, and chloracne.

Human studies related to PCB exposures have been done on the health of occupationally exposed workers, as well as on health effects noted following two incidents in which cooking oils contaminated with PCBs were ingested. Occupationally exposed workers typically demonstrated dermal problems such as chloracne, rashes, and burning sensations. While most biochemical parameters in these studies were found to be within normal ranges, one study reported an elevation of liver enzymes in exposed workers.

The two incidents, or outbreaks, concerning the ingestion of PCB-tainted cooking oils occurred in east Asia. The first incident, designated as the "Yusho" outbreak, occurred among Japanese (Higachi, 1976; Kurotsone and Shapiro, 1984); while the second, designated "Taichung", occurred among Taiwanese (Hsu et al, 1984; Lu and Wang, 1984). Health effects observed in humans following exposure included: chloracne, increased discharge from the eyes, soreness and weakness of limbs, headaches, dizziness, and general malaise. Because the cooking oil in the Yusho study was also found to be contaminated with highly toxic polychlorinated dibenzofurans, implications cannot be limited to PCBs alone in this study.

Reproduction and Development

The range of reported effects on reproduction in animals include: a lengthening of the estrus cycle, weak estrogenic activity, fetotoxicity, fetal deaths, decreased survival of the neonate, small birth weight, and a variety of teratogenic effects. Rats and mice appear to be more resistant to reproductive toxicity than mink or monkeys, which have also been used in studies. These differences may possibly be attributable to the duration of the studies and to differences in metabolic rates and pharmacokinetics.

Most of the studies used dosages that were maternally toxic. Maternal toxicity obviously is an important consideration when assessing reproductive and developmental toxicity. This consideration, frequently referred to as Karnofsky's rule, states that "any compound administered at the proper dosage, at the proper stage of development, or to embryos of the proper species will be effective in causing disturbances in embryonic development". This calls attention to the fact that if a pregnant animal is sick, the delicate balance between the mother and fetus is affected or disrupted, and adverse fetal effects can be expected.

There have been studies of the reproductive and developmental effects of combined exposure to PCBs subsequent to outbreaks of poisoning in Japan (Yusho) and Taiwan (Taichung). Findings in newborn children of exposed mothers include: fetal growth inhibition, low birth weight, dry brown skin pigmentation, precocious dentition, gingival hyperplasia, and abnormal calcification of the skull (DHHS 1985a).

Carcinogenicity and Mutagenicity

There have been a number of studies designed to assess carcinogenicity in animals. All but one study have been negative. The positive study by Kimbrough et al. (1975) reported a statistically significant increase in hepatocellular carcinomas among mice and rats administered Aroclor 1260 in the diet.

Epidemiological studies have not reported significant increases in cancer in occupationally exposed workers. Explanations for these findings may include an insufficient latency period and small sample sizes in the studies.

Based upon the above evidence, EPA has classified PCBs in Group B_2, with adequate evidence of carcinogenesis in animals, and inadequate evidence in humans (EPA 1985). IARC (1978) has classified PCBs in category 2B, based on studies indicating inadequate evidence for carcinogenicity in humans, sufficient evidence in animals, and inadequate evidence of activity in short-term mutagenicity tests.

EPA's cancer assessment group has calculated a unit cancer risk of 4.34 $(mg/kg/day)^{-1}$, using the upper 95 percent value of the doses used in the positive study (Kimbrough et al 1975).

Standards and Criteria

Drinking Water

As the first stage in developing a maximum contaminant level (MCL) for PCBs in drinking water, the EPA has recently proposed an MCLG of zero. EPA will establish an MCL taking into account technological feasibility of control and analytical feasibility (EPA 1988).

Surface Water

The EPA has established ambient water quality criteria for the protection of freshwater and saltwater aquatic life of 0.014 ug/l and 0.03 ug/l, respectively. For human health, EPA has estimated the drinking water concentration corresponding to one-in-a-million cancer excess of 0.0079 ng/l.

POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

Environmental Chemistry and Fate

In general, most priority pollutant PAHs can be characterized as having low vapor pressure, low water solubility, low Henry's Law Constants, high logarithms of the octanol-water partition coefficients (log K_{ow}s) and high organic carbon partition coefficients (K_{oc}s). The high K_{oc}s indicate that most PAHs are strongly sorbed to organic matter in the soils. This factor, combined with the low water solubilities, indicate that the rate of transport of most PAHs from the unsaturated zone via infiltration to the saturated zone will be extremely low. Low vapor pressure and low Henry's Law Constants indicate that most PAHs will not readily volatilize from surface water, and these factors, in combination with high K_{oc}s, also indicate low volatilization rates from surface soils.

The exceptions to the groundwater transport argument are four PAHs (acenaphthene, fluorene, fluoranthene, and pyrene) with water solubilities greater than 100 ug/L. Although these four compounds have high K_{oc}s (10^3 or greater) relative to other PAHs, their solubilities indicate that they are mobile, and may be observed in groundwater. The chemical and physical properties for the 14 priority pollutant PAHs are presented in Table 1.

Typically, although PAHs are regarded as persistent in the environment, they are degradable by soil microorganisms.

Degradation rates and degree of degradation are influenced by environmental factors, microbial flora and physicochemical properties of the PAHs themselves. Important environmental factors include temperature, pH, oxygen status, soil type, moisture, and nutrient status (Sims and Overcash 1983). Microbial factors include acclimation status, populations present, and the relative proportions of bacteria, fungi, and actinomycetes (Sims and Overcash, 1983). Physico-chemical properties include chemical structure, concentration, and lipophilicity.

Compounds which are easily and rapidly biodegraded include acenaphthene, naphthalene, and phenanthrene. Compounds which are persistent, requiring long time periods or specialized conditions for degradation, include benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene,

Table 2

PHYSICAL AND CHEMICAL PROPERTIES OF SELECTED PAHs*

Chemical Name	Molecular Weight (g)	CAS No.	Vapor Pressure (mm Hg)	Water Solubility (mg/L)	Henry's Law Constant	log Kow	Koc (mL/g)	BCF (L/kg)
acenaphthene	154	83-32-9	1.55×10^{-3}	3.42	9.2×10^{-5}	4.0	4.6×10^{3}	242**
anthracine	178	120-12-7	1.95×10^{-4}	4.5×10^{-2}	1.2×10^{-3}	4.45	1.4×10^{4}	1,210**
benzo(a)anthracene	228	56-55-3	2.2×10^{-8}	5.7×10^{-3}	1.16×10^{-6}	5.6	1.38×10^{6}	11,700**
benzo(b)fluoranthene	252	205-99-2	5.0×10^{-7}	1.4×10^{-2}	1.19×10^{-3}	6.06	5.5×10^{5}	
benzo(k)fluoranthene	252	207-08-9	5.1×10^{-7}	4.3×10^{-3}	3.94×10^{-3}	6.06	5.5×10^{5}	
benzo(g,h,i)perylene	276	191-24-2	1.03×10^{-10}	7.0×10^{-4}	5.34×10^{-8}	6.51	1.6×10^{6}	68,200**
benzo(a)pyrene	252	50-32-8	5.6×10^{-9}	1.2×10^{-3}	1.55×10^{-6}	6.06	5.5×10^{6}	28,200**
chrysene	228	208-01-9	6.3×10^{-4}	1.8×10^{-3}	1.05×10^{-6}	5.61	2.0×10^{5}	11,700**
dibenzo(a,h)anthracene	278	53-70-3	1.0×10^{-10}	5.0×10^{-4}	7.33×10^{-8}	6.8	33×10^{6}	
fluoranthene	202	206-44-0	5.0×10^{-6}	2.6×10^{-1}	6.46×10^{-6}	4.9	3.8×10^{4}	2,920
fluorene	116	86-73-7	7.1×10^{-4}	1.69	6.42×10^{-5}	4.2	7.3×10^{3}	1,300***
indeno(1,2,3-cd)perylene	276	193-39-5	1.0×10^{-10}	5.3×10^{-4}	6.86×10^{-8}	6.5	1.6×10^{6}	
phenanthrene	178	85-01-3	6.8×10^{-4}	1.0	1.59×10^{-4}	4.46	1.44×10^{4}	2,630**
pyrene	202	129-00-3	2.5×10^{-6}	1.32×10^{-3}	5.4×10^{-6}	4.88	3.8×10^{4}	2,800**

* Unless otherwise footnoted, data taken from EPA (1986a).

** EPA (1984i)

*** Lyman, Reihl, and Rosenblatt (1982).

chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene. The ease of biodegradation generally decreases with increasing molecular weight. Biodegradation products generally include hydroxylated PAH derivatives.

Noncarcinogenic Effects

Very little attention has been paid to the noncarcinogenic effects of PAHs. It is known, however, that rapidly proliferating tissues (e.g., bone marrow, lymphoid organs, testes, etc.) appear to be the preferred targets for PAH-induced cytotoxicity.

Acute and chronic exposure to various PAHs classified as carcinogens has resulted in the destruction of specific hematopoietic and lymphoid elements, ovotoxicity, anti-spermagenic effects, adrenal necrosis, and changes in the intestinal and respiratory epithelia. This tissue damage occurs at doses expected to induce carcinogens and malignancy risks predominant in evaluating PAH toxicity. For PAHs classified as noncarcinogenic, very little is known about toxic responses or mechanisms.

Carcinogenicity and Mutagenicity

The EPA has issued finalized carcinogenicity risk assessment guidelines (EPA, 1986b) to establish criteria for evaluating and categorizing chemicals into five groups, according to weight-of-evidence categories. According to this categorization scheme, five of the 15 priority pollutant PAHs have been placed in category B_2 (probable human carcinogens) with sufficient evidence of carcinogenicity in animals, and inadequate data for humans. A sixth PAH (indeno (1,2,3-cd) perylene) has been placed in category C, denoting possible human carcinogenicity based on limited evidence of carcinogenicity in animals in the absence of human data (EPA, 1986b). Table 2 contains EPA's most current categorization of priority pollutant PAHs (EPA, 1986b). Following its risk assessment guidelines, EPA typically performs quantitative risk assessments for groups B or A, and, in some cases (depending on the quality of the data), for group C.

To date, EPA has estimated a carcinogenicity slope (unit cancer risk) for carcinogenic PAHs using data for a single PAH, benzo(a)pyrene (BaP). This limited effort does not take into account the clearly docu-

Table 2

EPA CARCINOGENICITY CATEGORIZATION FOR ORAL AND INHALATION ROUTES OF EXPOSURE FOR THE 15 PRIORITY POLLUTANTS POLYCYCLIC AROMATIC HYDROCARBONS

Compound	EPA Carcinogenicity Classifications*	
	Inhalation	Oral
acenaphthene	D	D
anthracene	D	D
benzo(a)anthracene	B_2	B_2
benzo(b)fluoranthene	B_2	B_2
benzo(k)fluoranthene	D	D
benzo(g,h,i)perylene	D	D
benzo(a)pyrene	B_2	B_2
chrysene	B_2	B_2
dibenzo(a,h)anthracene	B_2	B_2
fluoranthene	D	D
fluorene	D	D
indeno(1,2,3-cd)perylene	C	C
naphthalene	D	D
phenanthrene	D	D
pyrene	D	D

* *Unless otherwise footnoted, classification taken from EPA (1986a).*

mented differences in quantitative dose-response relationships for the other PAHs. Two specialists in EPA's carcinogenic assessment group have evaluated the relative potency estimates for the other five carcinogenic PAHs to benzo(a)pyrene (Thorslund et al, 1986).

Using a series of sophisticated statistical procedures, these authors have derived estimated relative potencies for the five other "carcinogenic" PAHs relative to BaP. For the potency estimation, the authors used bioassays from individual laboratories in which BaP and the other PAHs were tested in common. The results of this procedure for developing relative potency estimates are summarized in Table 3.

Table 3

RELATIVE POTENCY ESTIMATES DERIVED FOR POLYCYCLIC AROMATIC HYDROCARBONS

CATEGORIZED IN GROUP A, B, OR C ACCORDING TO EPA'S WEIGHT OF EVIDENCE CRITERIA

Compound	Relative Potency Estimates
benzo(a)pyrene	1
benzo(a)anthracene	0.145
benzo(b)fluoranthene	0.140
chrysene	0.0044
dibenzo(a,h)anthracene	2.82
indeno(1,2,3-cd)perylene	0.232

Source: Thorslund et. al. (1986)

TETRACHLOROETHENE (PERCHOLOROETHYLENE OR PERC)

Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of tetrachloroethene (CAS No. 127-18-4) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	166
Water Solubility (mg/L at 25°C)	150
Vapor Pressure (mmHg at 25°C)	17.8
Henry's Law Constant (atm-m^3/mole)	2.6×10^{-2}
Log K_{ow}	2.6
K_{oc}	364
BCF	31

Tetrachloroethene's moderate water solubility and vapor pressure indicate that volatilization is the major loss mechanism from surface soil and surface water. Its moderate K_{oc} indicates that leaching to groundwater from lower soil depths is an important mechanism. In addition, tetrachloroethene is biodegraded by certain soil microorganisms by a sequential series of monodechlorinations. Once it reaches the groundwater, its moderate K_{oc} indicates that tetrachloroethene will be moderately absorbed to soil particles and will be moderately retarded relative to groundwater transport. Finally, tetrachloroetheme is subject to low bioconcentration in aquatic species.

Noncarcinogenic Effects

The principal toxic effects following acute exposure in animals to tetrachloroethene (PERC) are depression of the CNS, ataxia (failure of muscular coordination), and respiratory cardiac arrest (ATSDR 1987m, EPA 1985f). Subchronic and chronic effects in animals include damage to the liver and kidneys. In humans, the principal effects are CNS depression and liver toxicity.

Carcinogenicity and Mutagenicity

A 1977 NCI bioassay in which PERC was administered by gavage reported increased incidence of liver tumors in mice but not rats (EPA 1985d). A draft report of a NTP inhalation bioassay, currently under internal review, has noted an increased incidence of tumors in mice and rats. Although EPA has previously categorized tetrachloroethylene in Group B_2--probable human carcinogen (EPA 1985b, 1985h)--the Agency is awaiting final results of the NTP bioassay before commencing a rule-making for the chemical in drinking water.

PERC has been evaluated for its ability to cause gene mutation, chromosomal aberrations, unscheduled DNA synthesis, and mitotic recombination. In general, these responses have been weak and were observed at high concentrations that were cytotoxic (EPA 1985h). Additionally, no dose-dependent relationships were demonstrated in these studies (EPA 1985h).

Drinking Water Standards

EPA has not established an MCL for PERC in drinking water. The agency is scheduled to begin rule-making procedures to establish an MCL in the near future.

TOLUENE

Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of toluene (CAS No. 108-88-3) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	92
Water Solubility (mg/L at 25°C)	535
Vapor Pressure (mmHg at 25°C)	28.1
Henry's Law Constant (atm-m^3/mole)	6.4×10^{-3}
Log K_{ow}	2.73
K_{oc}	300
BCF	10.7

Toluene has a high water solubility, moderate vapor pressure, high Henry's Law Constant, and moderate K_{oc}. Based on the vapor pressure and K_{oc}, volatilization from surface soils is an important transport pathway. Based on the water solubility and moderate K_{oc}, toluene will be readily transported to groundwater, and upon reaching groundwater, be subject to a low degree of retardation relative to the groundwater flow. Based on the water solubility and high Henry's Law Constant, volatilization will be a major transport pathway from surface water.

Noncarcinogenic Effects

Acute or chronic exposure to high levels of toluene in animals results in CNS depression and effects on the lungs, liver, and kidney.

EPA has derived an AADI for drinking water consumption based upon a 24-month inhalation study in rats (EPA 1985c). Based upon a NOAEL of 1,130 mg/m^3, an uncertainty factor of 100, and assuming 50 percent pulmonary absorption, EPA derived an AADI of 10,100 ug/L (EPA 1985c).

Carcinogenicity and Mutagenicity

Only one long-term carcinogenicity bioassay of toluene has been reported. This study concluded that toluene was not carcinogenic following inhalation in rats. NTP is conducting carcinogenicity studies in which toluene is being administered by inhalation and gavage to rats and mice. In addition, carcinogenicity studies by European investigators are expected to be published in the next few years. According to weight-of-evidence carcinogenicity criteria, EPA has classified toluene in Category D, not classifiable as to human carcinogenicity (EPA 1985c).

Toluene has not been shown to be mutagenic in *in vivo* or *in vitro* assays (EPA 1985c).

Drinking Water Standards and Criteria

Standards. In the first stage of the rule-making process designed to establish a MCL for toluene in drinking water, EPA has issued a proposed MCLG of 2,600 ug/L derived from the AADI of 10,100 ug/L by allocating a 20 percent of drinking water contribution to total intake from all sources of exposure (EPA 1985c). Subsequent to finalization of the MCLG, EPA will evaluate analytical feasibility and feasibility of control in establishing an enforceable MCL.

Criteria. In the absence of adequate dose-response data for oral exposure to toluene, EPA derived a 1-day HA, based on NOAEL of 377 mg/m^3 reported in studies of humans, the subjects of single inhalation exposures of up to 8 hours. Based upon the NOAEL, an uncertainty factor of 100, and a variety of physiological parameters and intake assumptions, EPA derived 1-day HAs of 18,000 ug/L and 63,000 ug/L for a 10-kg child and 70-kg adult, respectively (EPA 1985d).

In the absence of sufficient data, EPA derived 10-day HAs of 6,000 ug/L (child) and 21,000 ug/L (adult), by applying an uncertainty factor of 3 to the 1-day HA. The Agency utilized a three-fold rather than the usual 10-fold uncertainty factor because toluene is rapidly distributed and excreted, and because the chemical presents little bioaccumulation potential relative to typical toxicants (EPA 1985d).

The EPA ambient water quality criterion for the protection of human health is 14,300 ug/L (EPA 1980a).

nausea, and general weakness. Effects on the liver include necrosis and epithelial cell damage, and on the kidney, degeneration of the proximal tubule (EPA 1985b)

Carcinogenicity and Mutagenicity

In a NCI bioassay, EDC administered by gavage was shown to increase the incidence of tumors in both mice and rats. Based upon these data, EPA has classified EDC according to weight-of-evidence carcinogenicity criteria in Group B_2 - probable human carcinogen (EPA 1987a).

EDC has shown to induce gene mutations in bacteria, plants, *Drosophilia melanogaster*, and cultured Chinese hamster ovary cells (EPA 1985i). In addition, EDC has been reported to cause meiotic chromosomal disjunction in *Drosophilia*. Based upon these data, EPA has determined based upon weight-of-evidence criteria that EDC is a mutagen that may have the potential for causing adverse effects in humans (EPA 1985i).

Drinking Water Standards and Criteria

Standards. In the first stage of a procedure to establish an enforceable MCL for EDC in drinking water, EPA has established a MCLG of 0. This MCLG was predicated on the EPA conclusion that no exposure to a "probable human carcinogen" is acceptable. Based upon considerations of analytical feasibility and feasibility of control, EPA has issued a MCL for EDC of 5 ug/L.

Criteria. In the absence of suitable data, EPA has not developed 1-day or 10-day HAs for EDC. EPA has, however, developed a longer-term HA based upon a NOAEL reported in a rat inhalation study. Based upon a NOAEL of 405 mg/m^3, an uncertainty factor of 100 and various intake assumptions and physiological parameters, EPA derived longer-terms HAs of 740 ug/L (10-kg child) and 2,600 ug/L (70-kg adult) (EPA 1985d). Because EDC was judged to be a probable human carcinogen, EPA did not develop a lifetime HA for noncarcinogenic effects.

EPA has not developed an ambient water quality criterion for EDC for the protection of human health.

HEXACHLOROBENZENE (HCB)

Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of hexachlorobenzene (CAS No. 118-74-1) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	285
Water Solubility (mg/L at 25°C)	0.006
Vapor Pressure (mmHg at 25°C)	1.1×10^{-5}
Henry's Law Constant (atm-m^3/mole)	6.8×10^{-4}
Log K_{ow}	5.23
K_{oc}	3900
BCF	8690

Hexachlorobenzene (HCB) has a low water solubility, a high log K_{ow}, and relatively high K_{oc}, indicating that the chemical will be strongly adsorbed in soil or sediments following discharge to surface water. The low vapor pressure and Henry's law constant indicate that votilization will not be a major transport mechanism from either soils or surface water. In addition, based on the log K_{ow} and high K_{oc}, significant leaching from source soils is not anticipated.

HCB is expected to be slowly degraded by soil or sediment micro-organisms. HCB is expected to significantly bioconcentrate in aquatic life with BCFs ranging from 5,500 to 44,437 in vertebrates (EPA 1985g).

Noncarcinogenic Effects

Porphyria cutonea tardea (PCT) has been demonstrated in Turkish citizens who accidentally consumed bread contaminated with HCB. PCT-associated symptoms observed included skin lesions and hyperpigmentation. In addition, HCB caused neurotoxicity, liver damage, arthritic conditions, and in children, reduced growth. Studies in rodents re-

TRICHLOROETHENE (TCE)

Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of trichloroethene (TCE) (CAS No. 79-01-6) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	131
Water Solubility (mg/L at 25°C)	1,100
Vapor Pressure (mmHg at 25°C)	57.9
Henry's Law Constant (atm-m^3/mole)	9.1×10^{-3}
Log K_{ow}	2.38
K_{oc}	126
BCF	10.6

The high water solubility and high vapor pressure of TCE indicate that volatilization will be the predominant loss mechanism from surficial soils. In soils and groundwater, trichloroethene is degraded to cis and trans 1,2-dichloroethylene, vinylidene chloride, and vinyl chloride (ATSDR 1987n). TCEs moderate organic-carbon partition coefficient indicates it is moderately adsorbed to soils, and will leach to groundwater. In light of its moderate Henry's Law Constant, volatilization will be the major fate process for TCE from surface water.

Trichloroethene is only moderately bioconcentrated in aquatic life.

Noncarcinogenic Effects

The principal toxicological effect of concern for trichloroethene (TCE) is carcinogenicity. Noncarcinogenic effects include CNS disturbances and kidney and liver damage following exposure to relatively high airborne concentrations (ATSDR 1987n).

Carcinogenicity and Mutagenicity

Six studies of the carcinogenicity of TCE in animals have been published. Two have reported significant increases in liver tumors in mice. EPA has judged three others as technically flawed. A sixth reported that TCE, containing epichlorohydrin and epoxybutane, was carcinogenic in a less responsive mouse strain, but pure TCE was not (EPA 1985b). Recognizing the lower responsiveness of the mice in the latter study, EPA has classified TCE based upon weight-of-evidence carciongenicity guidelines in Category B2--probable human carcinogen (EPA 1987a).

Commercial TCE containing stabilizers has been reported to be weakly mutagenic in a variety of *in vitro* and *in vivo* assays representing a wide evolutionary range of organisms (EPA 1985g). Based on these data, EPA has concluded that commercial TCE may have the potential to cause weak or borderline increases above the spontaneous level of mutagenic effects in exposed human tissues (EPA 1985g).

Drinking Water Standards

EPA has established a drinking water MCL for TCE of 5 ug/l (EPA 1987a).

1,2-DICHLOROETHANE (ETHYLENE DICHLORIDE OR EDC)

Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of 1,2-dichloroethane (CAS No. 107-06-2) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	99
Water Solubility (mg/L at 25°C)	8.5×10^{-3}
Vapor Pressure (mmHg at 25°C)	64
Henry's Law Constant (atm-m^3/mole)	9.8×10^{-4}
Log K_{ow}	1.48
K_{oc}	14
BCF	1.2

A half-life of 1,2-dichloroethane from soil could not be located in the available literature; however, based on its moderate vapor pressure, evaporation is expected to be the predominant loss mechanism from the top layer of soil. In subsurface soil, biochemical and chemical biodegradation are expected to be slow. Therefore, based on its low K_{oc}, 1,2-dichloroethane is expected to leach and be transported to groundwater. Once in groundwater, the low K_{oc} indicates 1,2-dichloroethane will be mildly adorbed to soil particulate and will be subject to low retardation relative to the groundwater flow. In addition, its high Henry's Law Constant indicates evaporation from surface water is an important fate mechanism. Based on its low BCF, 1,2-dichloroethane is not expected to bioconcentrate in aquatic life.

Noncarcinogenic Effects

At relatively high doses, 1,2-dichloroethane (EDC) produces CNS depression as well as injury to the liver, kidney, and adrenals. Symptoms of CNS depression typically include headache, dizziness,

DICHLOROBENZENES

Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of 1,2-dichlorobenzene (CAS No. 95-50-1); 1-3-dichlorobenzene (CAS No. 541-73-1); and 1,4-dichlorobenzene (CAS No. 106-16-7) are presented below.

Compound	1,2-DCB	1,3-DCB	1,4-DCB
Molecular Weight (g/mole)	147	147	147
Water Solubility (mg/L at 25°C)	100	123	79
Vapor Pressure (mmHg at 25°C)	1	2.3	1.2
Henry's Law Constant ($atm\text{-}m^3$/mole)	1.9×10^{-3}	3.6×10^{-3}	2.9×10^{-3}
Log K_{ow}	3.6	3.6	3.6
K_{oc}	1700	1700	1700
BCF	5	5	5

The log K_{ow}, high K_{oc}, and low vapor pressure indicate that adsorption onto soils is the major fate process of DCB isomers in soils. Similarly, adsorption to these media will dominate transport and fate of the isomers discharged into aquatic media.

The log K_{ow}s suggest that DCB isomers will bioaccumulate. Biodegradation is not likely to be a significant degradation pathway for DCB isomers, based upon data which indicate that chlorobenzene is resistent to biodegradation and that resistance increases with increasing chlorination of the benzene ring (ATSDR 1987i).

Noncarcinogenic Effects

The principal toxic effects of o-dichlorobenzene (1,2-dichlorobenzene or o-DCB) and p-dichlorobenzene (1,4-dichlorobenzene or p-DCB) in humans and other animals from acute and longer-term exposures include

CNS depression; blood dyscrasias; and lung, kidney, and liver damage. Similar data are not available for m-dichlorobenzene (1,3-dichlorobenzene or m-DCB). However, based upon short-term assays, EPA has determined that short-term assessments developed for o-DCB should apply to m-DCB.

Carcinogenicity and Mutagenicity

The few studies available on the carcinogenic potential of the DCBs have been negative or insufficient to clearly classify any DCB isomer as carcinogenic. Preliminary results of an NTP gavage bioassay indicate that o-DCB was not carcinogenic under the conditions of the experiment. Pending receipt of the final NTP report for o-DCB, EPA has categorized o-DCB according to Agency weight-of-evidence carcinogenicity criteria in Group D, not classifiable as to human carcinogenicity (EPA 1987d). EPA has classified p-DCB in group C, limited evidence of carcinogenicity in animal studies (EPA 1987a).

In general, DCBs have shown little or no mutagenic activity in a range of bacterial systems. However, several studies with mold and plant cultures treated with DCBs have reported mutations and chromosomal alterations (EPA 1987d).

Drinking Water Standards and Criteria

EPA has established a final drinking water MCL for p-dichlorobenzene of 75 ug/l (EPA 1987a). This MCL was based on a reference dose of 0.1 mg/kg/day, an uncertainty factor of 10, allocation of 20% of total human intake from all exposure sources to drinking water and various intake and physiological assumptions. EPA is also in the process of establishing an enforceable MCL for o-DCB and p-DCB, but not m-DCB. As a first step in the process, EPA has issued a proposed MCLG for o-DCB based upon a NOAEL reported in a subchronic gavage study in mice and rats. Based upon a NOAEL of 125 mg/kg/day, an uncertainty factor of 100, and the same assumptions as for p-DCB, EPA has derived a proposed MCLG for o-DCB of 620 ug/L.

In the absence of sufficient data, EPA has not developed, and is not in the process of developing, a drinking water standard for m-DCB.

CHLOROPHENOLS (2-CHLOROPHENOL AND 2,4-DICHLOROPHENOL)

Environmental Chemistry and Fate

The relevant physical and chemical properties of chlorophenol (CP-CAS No. 95-57-8) and 2,4-dichlorophenol (DCP-CAS No. 12-83-2) are summarized in the Table below (Arthur D. Little, Inc. 1982).

Compound	2-chlorophenol	2,4-dichlorophenol
Molecular Weight (g/mole)	129	163
Water Solubility (mg/L at 25°C)	28,500 (20°C)	4,600 (20°C)
Vapor Pressure (mmHg at 25°C)	2.2	0.11
Henry's Law Constant (atm-m^3/mole)	1.3×10^{-3}	5.0×10^{-6}
Log K_{ow}	2.17	2.75
K_{oc}	No data	380
BCF	214	130

The above data show that both CP and DCP have high water solubilities and low vapor pressures. Additionally, using the K_{oc} of DCP, the two chlorophenols have moderate K_{oc}s. These three values indicate that both volatilization from surface soils and infiltration to groundwater are important transport pathways. The high Henry's law constant, along with the high water solubility and moderate K_{oc}, indicates that volatilization is an important transport pathway from surface water. However, its low Henry's law constant indicates that both volatilization and partitoning to sediments are important pathways in surface water.

Biodegradation in soils and surface water are significant transformation processes (Aurthur D. Little, Inc., 1982). No data were found concerning biodegradation in groundwater.

Bioconcentration factors (BCFs) indicate moderate bioconcentration in aquatic species.

Noncarcinogenic Effects

In rodents subjected to acute high oral exposures, CP and DCP elicited respiratory excitation, clonic convulsions, and/or motor weakness (hypotonia). Few long-term animal studies are available. Those few that are available show reduction in hematological parameters or enzyme changes. No data were found concerning effects of CP and DCP on the developing embryo or the reproductive process.

Carcinogenicity and Mutagenicity

No data were found concerning the potential carcinogenicity of CP or DCP by the oral route. However, CP and DCP were reported to promote tumors following a single dermal application of dimethylbenzanthracene on mouse skin (Boutwell and Bosch, 1959).

CP has been shown to be mutagenic in Sprague Dawley rats fed 130 mg/kg CP every other day for one week (Chung 1978). In these rats a six-fold increased incidence of chromatid deletions (12% vs. 2% in controls) was seen. Complete inhibition of mitosis was reported in bone marrow cells taken from treated rats.

DCP, tested using the Ames *Salmonella* microsomal assay, was reported as not mutagenic with and without activation.

Consequently, whereas CP can be classified as mutagenic, there are insufficient data to evaluate the mutagenicity of DCP.

Drinking Water Standards

EPA has not issued any drinking water standards, health advisories, or other criteria for CP or DCP.

1,1,1-TRICHLOROETHANE (TCA)

Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of 1,1,1-trichloroethane (CAS No. 71-55-6) are summarized below. (EPA 1986a).

Molecular Weight (g/mole)	133
Water Solubility (mg/L at 25°C)	1,500
Vapor Pressure (mmHg at 25°C)	123
Henry's Law Constant (atm-m^3/mole)	1.4×10^{-2}
Log K_{ow}	2.5
K_{oc}	152
BCF	5.6

1,1,1-trichloroethane (TCA) can be characterized as having a high water solubility, a high vapor pressure, a high Henry's Law Constant, and a moderate K_{oc}. The high vapor pressure and moderate K_{oc} indicate that volatilization will be a major transport pathway in surfical soil. In subsurface soils, the high water solubility and moderate K_{oc} indicate that transport to groundwater represents a major pathway, and once the water table is reached, chemical transport will be moderately retarded relative to the groundwater flow. The high vapor pressure, high Henry's Law Constant, and high water solubility indicate that volatilization from surface water will be a major transport pathway.

Noncarcinogenic Effects

The principal noncarcinogenic effects of 1,1,1-trichloroethane (TCA) following exposure in animals and man are depression of the CNS, increase in liver weight, and cardiovascular changes. Current data do not suggest that TCA is a reproductive or developmental toxin.

EPA has developed a risk reference dose (RRfD) of 0.35 mg/kg/day based upon a NOAEL of 1,365 mg/m^3 reported in a study in which mice were exposed by inhalation for 14 weeks. EPA derived the RRfD by application of an uncertainty factor of 100, a 30% absorbed dose, and standard physiological parameters (EPA 1985g).

Carcinogenicity and Mutagenicity

There have been two TCA carcinogenicity bioassays. The first, conducted by NCI, was judged to be inadequate due to poor survival in treated animals. Preliminary results of the second, by NTP, showed elevated incidences of hepatocellular carcinomas. These initial results have been questioned and the study is currently being audited (EPA 1985b). Based upon these results, EPA has classified TCA according to weight-of-evidence criteria in Group D, not classifiable--inadequate human and animal evidence of carcinogenicity (EPA 1987a).

Drinking Water Standards and Criteria

Standards. EPA has established a drinking water MCL for TCA of 200 ug/L.

Criteria. EPA has developed a 1-day HA based upon a LOEL of 1.4 g/kg/day reported in a study of rats receiving a single oral dose of TCA. Based upon the LOEL, and standard weight and intake assumptions, EPA derived a 1-day HA of 14,000 ug/L for a 10-kg child (EPA 1984d). In the absence of sufficient data, EPA has not developed a 10-day HA. EPA has developed longer-term HAs of 35,000 ug/L (child) and 125,000 ug/L (adult), based upon a NOAEL of 0.5 g/kg/day reported in a study in rats receiving TCA by gavage for 12 weeks (EPA 1985d).

The EPA lifetime HA of 200 ug/L is equivalent to and was derived by the same methodology as the RMCL (EPA 1985d).

The EPA ambient water quality criterion for TCA for the protection of human health is 18,700 ug/L (EPA 1980a).

Noncarcinogenic Effects

Chlorobenzene exerts its toxicity primarily on the central nervous system, liver, and kidney. Liver effects include necrosis and interference with porphyrin metabolism. Kidney effects include swelling of the tubular and glomerular epithelia. Hematopoietic effects (e.g., lymphocytosis and leukopenia) have been reported among chlorobenzene-exposed workers; however, it is uncertain whether these effects can be attributed to chlorobenzene or to other contaminants (EPA 1985g).

Carcinogenicity and Mutagenicity

In a single National Toxicology Program (NTP) bioassay, chlorobenzene was found not to be carcinogenic in mice and rats. The NTP report did note that chlorobenzene induced a statistically significant increased incidence of neoplastic nodules in rates exposed to the highest dose. On this basis, EPA classified chlorobenzene according to weight-of-evidence carcinogenicity criteria in Group C -- limited evidence in animals, no evidence in humans (EPA 1985g).

Most mutagenicity assays of chlorobenzene in bacteria, fungal, and mammalian tissue cultures have been negative (EPA 1985h). One study, however, in *Streptomyces antibioticus* reported that chlorobenzene induced reversion to vitamin B1 prototrophy, and one study in *Saccharomyces cerevisiae* showed increased mitotic crossing (EPA 1985k).

Drinking Water Standards and Criteria

Standards. EPA has not established an MCL or MCLG for chlorobenzene in drinking water.

Criteria. In the absence of suitable data, EPA has not derived a 1-day HA for chlorobenzene. EPA has, however, developed 10-day, longer-term, and lifetime HAs by application of 100-fold uncertainty factors and various intake assumptions and physiological parameters to NOAELs reported in animal studies (EPA 1985g). The 10-day advisory of 1,800 ug/L for a 10-kg child was derived from a NOAEL of 345 mg/m^3 reported in an inhalation teratology study in rats and rabbits; the longer-term HAs of 9,000 ug/L (child) and 30,000 ug/L (adult) were derived using a NOAEL of 125 mg/kg/day reported in a subchronic gavage study in mice and rats.

The lifetime HA of 600 ug/L was derived from the NOAEL used in the derivation of the longer-term HA, using an additional uncertainty factor of 10 and assuming that drinking water comprises 20% of the total daily intake.

NAS has estimated, based upon the draft NTP, that a drinking water concentration of 2.3 ug/L would correspond to an estimated one-in-a-million incremental excess lifetime cancer risk (NAS 1983).

EPA has developed an ambient water quality criterion for the protection of human health of 488 ug/L and for organoleptic (odor and taste) effects of 20 ug/L (EPA 1980a).

which cadmium has been administered orally have been negative. Recent epidemiological studies indicated that workers chronically exposed to cadmium are at risk of elevated lung cancer mortality. According to its weight-of-evidence carcinogenicity criteria, EPA has classified cadmium in Group B1 (probable human carcinogen) for inhalation based on the epidemiological data (EPA 1986a).

While the Agency has concluded that cadmium is a carcinogen by the inhalation route, EPA has classified the chemical in Group D, inadequate evidence for carcinogenicity for the oral route of exposure, because of the negative results reported for cancer bioassays in which cadmium was administered orally (EPA 1986a). Consistent with this categorization, EPA has proposed that the MCL for cadmium be set based upon noncarcinogenic toxicological endpoints.

Drinking Water Standards

The current MCL for cadmium, under the National Interim Primary Drinking Water Regulations, is 10 ug/L. This level was designed to prevent renal dysfunction, and was based on a critical value of cadmium in the kidney cortex of 200 ug/g, and assumptions on gastrointestinal absorption, excretion of the absorbed dose, daily excretion of the total body burden, and daily dietary cadmium intakes. The World Health Organization (WHO) guideline for drinking water is 5 ug/L. This value was based on a value for provisional tolerable weekly cadmium intake, assuming that 25% of the total cadmium intake was attributable to drinking water. EPA has proposed an MCLG of 5 ug/L based upon the WHO guidelines and the NAS SNARL (EPA 1985c).

CHLOROBENZENE

Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of chlorobenzene (CAS No. 108-90-7) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	113
Water Solubility (mg/L at 25°C)	466
Vapor Pressure (mmHg at 25°C)	11.7
Henry's Law Constant (atm-m^3/mole)	3.7×10^{-3}
Log K_{ow}	2.84
K_{oc}	330
BCF	10

Chlorobenzene's moderate water solubility, vapor pressure, and Henry's Law Constant indicate that volatilization from surficial soils and surface water is a major transport pathway.

Once adsorbed on soil, the moderate solubility and K_{oc} (330) indicate that chlorobenzene will leach and be transported to groundwater. The degree and rate of leaching will depend on a variety of factors including the soil type, organic carbon content, and the presence of organic solvents in the soil. Once chlorobenzene reaches the groundwater, the K_{oc} indicates that retardation relative to the groundwater flow will occur due to partitioning and adsorption to soil particles.

Current data indicate that degradation of chlorobenzene in aquatic systems is slow (EPA 1985). The estimated BCF of 10 indicates that monochlorobenzene is only slightly bioconcentrated in aquatic life.

CADMIUM

Environmental Chemistry and Fate

The primary sources of atmospheric cadmium are combustion of coal and petroleum products. Cadmium from these sources is primarily adsorbed on small, highly respirable particles, which can be transported over large distances and transferred to other environmental compartments via wet deposition. Cadmium adsorbed to small particulates is more persistant than that adorbed to larger particulates. Photochemical reactions are apparently not involved in the environmental fate of cadmium (ATSDR, 1987h).

Relative to other metals, cadmium is mobile in surface water. In natural waters, cadmium exists as a hydrated ion, metal-inorganic complexes with carbonate hydroxyl, chlorine or sulfate anions; or as metal-organic complexes with humic acids (ATSDR, 1987h).

Because it exists only as the divalent cation, aqueous cadmium is not strongly influenced by the redox potential of water. However, under reducing conditions forming sulfide, cadmium will precipitate in sediments as cadmium sulfide. The concentration of aqueous cadmium is usually inversely related to the pH value and the amount of organic material present (ATSDR 1987h). Humic acid substances account for most of the organic complexes, with solubility dependant on the nature of the humic substance. Sorption by clays and iron oxides is important in reducing aquatic cadmium concentrations.

Cadmium concentrations are typcially low in groundwater due to several factors. These factors include sorption by mineral matter and clay, binding to humic substances, precipitation as cadmium sulfide in the presence of sulfide, and precipitation as cadmium carbonate at high pHs.

In soil, cadmium may occur as free cadmium compounds or as the divalent ion dissolved in soil. As a consequence of cation exchange, cadmium may be bound to soil minerals or organic constituents. The aerobic nature of topsoils tends to reduce the amount of cadmium bound to sulfide. High soil acidity favors release of the divalent cadmium cation and its uptake by plants.

Cadmium is not reduced or methylated by microorganisms. However, the biological production of sulfide results in cadmium precipitation. Cadmium is strongly accumulated by all organisms, with concentrations in freshwater and marine organisms hundreds to thousands of times higher than in water being typical. Bioaccumulation of cadmium is strongly correlated with soil cation-exchange capacity (CEC), decreasing with increasing CEC. Bioconcentration in aquatic life is greatest for bottom feeders (e.g. mollusks and crustaceons), followed by fish and aquatic plants (ATSDR, 1987h). Bioaccumulation due to the use of cadmium-containing pesticides on food crops has been noted in beef and poultry.

Noncarcinogenic Effects

Acute and chronic exposure to cadmium in animals and humans results in renal dysfunction, hypertension, anemia, and altered liver microsomal activity. The kidney is considered to be the critical target organ in humans chronically exposed to cadmium by ingestion. The early clinical signs of renal injury include proteinuria, glucosuria, and amino-aciduria.

To calculate a drinking water equivalent level (DWEL), EPA used renal dysfunction as an endpoint, and the most widely accepted estimate for the critical (threshold) concentration of cadmium in the renal cortex--200 ug/g. Using a 4.5% absorption of the daily dose and 0.01% excretion in the total body burden per day, EPA calculated an LOAEL of 352 ug/day for renal effects in humans. Incorporating an uncertainty factor of 10, EPA has developed an RfD of 35 ug/day. Adjusting the RfD for consumption of 2 liters of water per day, EPA has derived a provisional DWEL of 18 ug/L (EPA 1985c).

Embryotoxic and teratogenic effects have been demonstrated in many mammalian species following parenteral administration of high doses of cadmium. In contrast, there is little evidence of these effects at lower doses by either of the more relevant inhalation or oral exposure routes (EPA 1981, ATSDR 1987h).

Carcinogenicity and Mutagenicity

Cadmium chloride aerosol administered by inhalation for 18 months produced lung tumors in rats. In contrast, all cancer bioassays in which influence soil mobility include soil type, the amount of rainfall, the depth to groundwater, and the extent of degradation (ATSDR 1987b).

Benzene is rapidly degraded in the atmosphere via reaction with the hydroxy radical. In soils and waters, biodegradation is an important process.

Noncarcinogenic Effects

The best known and longest recognized toxic effect of benzene in humans is depression of bone marrow function. Benzene-exposed individuals have been found to display anemia, leucopenia, and/or thrombocytopenia (EPA 1985c, ATSDR 1987b). When simultaneous depression of all three cell types (pancytopenia) is accompanied by bone marrow necrosis, the syndrome is called aplastic anemia.

Carcinogenicity and Mutagenicity

Excess leukemia mortality, particularly acute myelogenous and monocytic leukemia, has been demonstrated among humans occupationally exposed to benzene. In addition to this definitive human evidence, several long-term bioassays have demonstrated increased incidences of tumors and leukemia following administration in animals. Based primarily upon the direct evidence in man, EPA has classified benzene according to weight-of-evidence carcinogenicity criteria in Group A, human carcinogen-sufficient evidence from epidemiological studies (EPA 1987a).

Benzene has been tested extensively for genotoxic properties. Benzene was not mutagenic in several bacterial and yeast systems. Equivocal results have been reported for clastogenic results *in vitro*; several investigators have reported positive results in mouse micronucleus assays, as well as studies of chromosomal observations in rabbits.

Many investigators have reported significant increases in chromosomal aberrations in symptomatic and asymptomatic workers with either a current or past history of exposure to benzene.

Drinking Water Standards

EPA has established a final drinking water MCL of 5 ug/L (EPA 1987a).

is 22 ug/L, corresponding to 1 x 10^{-5} lifetime excess cancer risk calculated on the basis of an epidemiological study of skin cancer among Taiwanese exposed via drinking water (EPA 1980a).

BENZENE

Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of benzene (CAS No. 71-43-2) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	78
Water Solubility (mg/L at 25°C)	1,750
Vapor Pressure (mmHg at 25°C)	95.2
Henry's Law Constant (atm-m^3/mole)	5.6×10^{-3}
Log K_{ow}	2.12
K_{oc}	83
BCF	5.2

Benzene has a high water solubility and vapor pressure. As a consequence of these two properties, benzene can be characterized as a highly mobile chemical. For benzene released to air, some rainwater w-ashout is anticipated. After deposition in water or soil, volatilization is expected to return some portion back to the atmosphere. Based on its high Henry's Law Constant, volatilization will result in substantial loss to the atmosphere following release to water.

Due to its high water solubility and high vapor pressure, transport to sediments is not expected to be major surface water fate process.

Benzene released to soil can be transported to air via volatilization, to surface water via runoff, and to groundwater via leaching. The first two pathways predominate in surficial soil, whereas the latter pathway predominates at lower soil depths.

According to criteria developed by Kenaga (1980), benzene with a K_{oc} of 83 would be considered to be mobile in soils. Other factors methylated arsenicals and elemental arsenics in very reduced conditions (e.g., swamps and bogs)(ATSDR 1987a).

As noted above, microorganisms may reduce and methylate arsenicals in water and soil, resulting in volatilization and emission to the air. The volatilization rate is heavily dependant on whether soil is oxygenated or anaerobic, the pH, and the microbe types and concentrations in soils.

In aquatic systems, bioconcentration of arsenic primarily occurs in algae and lower invertebrates, but biomagnification does not appear to be significant (Callahan 1979).

Plants may accumulate arsenic via root uptake, with uptake being dependent on the species, soil arsenic concentration, and soil characteristics.

Noncarcinogenic Effects

At high doses, arsenic compounds have been shown to produce acute and chronic toxic effects including irreversible systemic damage. The trivalent compounds are the most toxic and tend to accumulate in the body. Animal studies have shown that chronic arsenic exposure may cause body weight changes, decreased blood hemoglobin, liver damage, and kidney damage.

There is evidence that arsenic is an essential element enchancing growth and development in certain animal species, and it has been suggested that arsenic may be an essential element for humans (NAS 1980). Whether or not arsenic is an essential element is the subject of continuing research.

Teratogenic effects of arsenic compounds at relatively high exposure levels have been demonstrated in a number of animal species (EPA 1984f, ATSDR 1987a). Generally, these effects have been observed following parenteral (injection) administration; whereas, administration at lower doses by the more relevant oral route has not resulted in any significant reproductive or developmental effects.

Mutagenicity and Carcinogenicity

Arsenic has been shown to be mutagenic in several assay systems and to induce chromosomal aberrations *in vivo* and *in vitro*. Animal carcinogenicity studies have reported conflicting results. Several studies have reported an increased incidence of bronchogenic carcinomas in rats exposed intratracheally to an arsenic-containing pesticide. Reasons for inconsistent carcinogenicity findings in animals may include inappropriate selection of an animal model, and use of flawed study designs. In humans, epidemiologic studies and case reports have reported that arsenic is associated with tumors of the skin, lungs, genital organs, and visual organs (EPA 1984f, EPA 1985c, ATSDR 1987a).

EPA has classified arsenic in Group A, i.e., a human carcinogen, based on extensive evidence of human carcinogenicity through inhalation and ingestion exposure (EPA 1985c).

Drinking Water Standards and Criteria

Standards. The current MCL for arsenic under the National Interim Drinking Water Regulations is 50 ug/L. The NAS Drinking Water Committee has analyzed the toxicology of arsenic (NAS 1983a). Based upon this evaluation, NAS recommended the retention of the MCL pending resolution of the question whether arsenic is an essential element in the human diet.

NAS also examined the available epidemiologic studies which were designed to investigate the relationship between arsenic exposure and skin cancer in the United States. The conclusion of the report was that these studies lacked statistical power to determine if arsenic causes skin cancer. However, the report stated that precursors of skin cancer, normally seen in cases of arsenic-induced skin cancer, were not seen in these studies.

Consistent with the NAS recommendations, EPA has proposed that the MCLG remain at the current MCL of 50 ug/L. In its determination, EPA stated that the MCL was below concentrations at which noncarcinogenic toxicity had been demonstrated and was within the concentration range which might be, based on further investigation, essential for humans (EPA 1985c).

Criteria. Based upon recommendations of NAS, EPA has proposed that all health advisories for arsenic be set at 50 ug/L (EPA 1985d). The EPA ambient water quality criterion for the protection of human health

APPENDIX F

TOXICITY PROFILES FOR SELECTED CONTAMINANTS OF CONCERN

ARSENIC

Environmental Chemistry and Fate

Arsenic may be released to the atmosphere as a gas or vapor; or absorbed to particulate matter and transported to other media by dry or wet deposition (ATSDR 1987a). Because trivalent arsenic may undergo oxidation in the air, atmospheric arsenic is usually a mixture of trivalent and pentavalent forms. Most airborne arsenic is usually adsorbed on small diameter particulate matter. Photolysis is not considered to be an important fate process for arsenic.

Arsenic in surface water can undergo a complex pattern of transformations: oxidation-reduction, ligand exchange, biotransformation, and precipitation and adsorption (Callahan 1979). As a consequence of these reactions, arsenic is extremely mobile in aquatic systems, and riverborne arsenic is capable of being transported great distances. Factors most strongly influencing the rates of these reactions include: Eh, Ph, metal sulfide and sulfide ion concentrations, iron concentration, presence of phosphorus minerals, temperature, salinity, and distribution and composition of biota (Callahan 1979).

Sorption onto clays, iron oxides, manganese compounds, and organic matter is an important fate in surface water, with sediment serving as a reservoir for most of the arsenic entering surface water. Sediment-bound trivalent and pentavalent arsenic, methylated by aerobic and anaerobic microorganisms, may be released back into the water column.

Soluble forms of arsenic adsorb to soil and travel with the soil matter with which they are associated. Shifts in oxidation state may occur in either direction, depending on the particular characteristics of the soil and groundwater. Volatilization of methylated arsenics from groundwater is possible.

Arsenic in soil is predominantly found in an insoluble, adsorbed form. Clay with high anion-exchange capacity strongly adsorbs pentavalent arsenic. Other important adsorption processes include complexation and chelation by organic material, iron, or calcium. Leaching of arsenic is usually important in the top 30 centimeters of soil, but may also be important at greater depth in sandy soils. Arsenate predominates in aerobic soils; arsenite in slightly reduced soils; arsine,

4-METHYL-2-PENTANONE

Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of 4-methyl-2-pentanone are summarized below (Verscheuren 1983).

Molecular Weight (g/mole)	100
Water Solubility (mg/L at 25°C)	19,000
Vapor Pressure (mmHg at 25°C)	6 (20°C)
Henry's Law Constant (atm-m^3/mole)	no data found
Log K_{ow}	no data found
K_{oc}	no data found
BCF	no data found

4-methyl-2-pentanone (MIBK) has a high water solubility and moderate vapor pressure. As a consequence of these two properties, benzene can be characterized as a moderately mobile chemical. For MIBK released to air, some rainwater washout is anticipated. After deposition in water or soil, volatilization is expected to return some portion back to the atmosphere.

Due to its high water solubility and moderate vapor pressure, some transport to sediments is expected.

MIBK released to soil can be transported to air via volatilization, to surface water via runoff, and to groundwater via leaching. The first two pathways predominate in surficial soil whereas the latter pathway predominates at lower soil depths.

Noncarcinogenic Effects

In high concentrations, MIBK produces narcosis with symptoms of headache, nausea, lightheadedness, and vomiting.

Carcinogenicity and Mutagenicity

MIBK has not been tested in a long-term animal carcinogenesis bioassay. Consequently MIBK would be categorized according to EPA carcinogenic risk criteria in group D - insufficient data, MIBK has not been shown to be mutagenic.

Standards and Criteria

There are no EPA drinking water standards, health advisories or ambient water quality criteria for the protection of human health for MIBK.

EPA has concluded that all of the above effects point toward a generalized impairment of normal physiological functioning of several different organ systems as adult PbB levels exceed 30 to 40 ug/dl. Evidence of impaired heme synthesis effects in blood occur at even lower levels.

More recent research has indicated that there is a relationship between PbB levels and increases in blood pressure. Preliminary review of this work indicates a statistically significant correlation between PbB levels and diastolic blood pressure in white males, ages 40 to 50, with no threshold apparent in the range of 6 to 30 ug/dl. Of particular concern is the finding of a 2 mm Hg increase in diastolic pressure per incremental PbB level increase of 0.5 ug/dl. Possible increases in risk of more severe medical events (stroke, heart attack, death) associated with lead-induced increases in blood pressure are also estimated in one of the recently published studies.

Children represent a sensitive subpopulation with regard to lead toxicity. As with adults, lead affects many different ogan systems and biochemical/physiological processes across a wide range of exposure levels. Effective PbB levels for producing encephalopathy or death in children are lower than in adults, starting at approximately 80 to 100 ug/dl. Permanent metal retardation and other marked neurological deficits are among lasting neurological sequelae typically seen in cases of nonfatal childhood lead encephalopathy. Other overt neurological signs and symptoms of subencepthalopathic lead intoxication, such as peripheral neuropathies (functional and/or pathological changes in the peripheral nervous system), have been detected in some children at PbB levels as low as 40 to 60 ug/dl. Chronic kidney disease is not evident at PbB levels above 100 ug/dl. Moreover, colic and other overt gastrointestinal symptoms occur in children, at least down to 60 ug/dl. Rank anemia is also evident at 70 ug/dl, representing an extreme manifestation of reduced hemoglobin synthesis at PbB levels as low as 40 ug/dl. All these effects are widely accepted as adverse health effects, and are reflective of widespread marked impact of lead on the normal physiological functioning of many different organ systems (EPA 1984d, 1985c, ATSDR 1987j).

Additional studies demonstrate further important health effects occurring in non-overtly lead-intoxicated children at similar or lower PbB levels than those indicated above. Among the most important and controversial of these electrophysiological and neuropsychlological effects are indications of peripheral nerve dysfunction, indexed by slowed nerve conduction velocities (NCV) found in children with PbB levels lower than 30 ug/dl. EPA has concluded that while none of these studies on CNS effects can individually be regarded as conclusively proving significant cognitive (IQ) or behavioral effects occurring below 30 ug/dl, they clearly indicate likely assoications between neuropsychologic deficits and PbB levels as low as 30 to 50 ug/dl. The magnitude of average observed IQ deficits is approximately 5 points at mean PbB levels of 50 to 70 ug/dl and about 4 points at mean levels of 30 to 50 ug/dl. Whether a smaller risk exists at somewhat lower levels (15 to 30 ug/dl) cannot be determined at this time (EPA 1984d, 1985c).

Many different impacts (representing potentially impaired functioning and depleted reserve capacities of many different tissues and organs) have been noted at PbB levels below 30 ug/dl.

At PbB levels around 10 to 15 ug/dl, initial signs of detectable heme synthesis impairment occur in many different organic systems, indications of increasing degrees of pyrimidine metabolism interference, signs of altered nervous system activity, and interference in vitamin-D metabolism. EPA has stated that, on the basis of these data, these effects might be viewed as becoming sufficiently adverse to warrant avoidance as PbB levels exceed 20 to 25 ug/dl (EPA 1985c).

Reproduction and Development

There is a paucity of data on which to evaluate the effects of lead on reproduction and development in humans. Early studies of pregnant women exposed to high levels of lead indicated toxic, but not teratogenic, effects on the conceptus. One recently reported study hints at birth anomalies possibly associated with exposure to low lead levels (mean cord blood level of 15 ug/dl) among women in the general population. However, the significance of these studies has been questioned because of the absence of reported statistically significant associations between cord blood levels and specific types of minor anomalies or any major anomalies. There are also no reliable data pointing to adverse effects in human offspring following lead exposure to fathers.

EPA has concluded that the current collective human data regarding lead's effects on reproduction on <u>in utero</u> development are insufficient for accurate estimation of exposure-effect or no-effect levels (EPA 1984d). In the absence of sufficient data, it has been suggested that it would be prudent to avoid lead exposures resulting in PbB levels exceeding 25 to 30 ug/dl to pregnant women and women of child-bearing age in general. This conclusion was based on the known equilibration between maternal and fetal blood lead concentrations and growing evidence of deleterious effects in young children as PbB levels approach 25 to 30 ug/dl. Industrial lead exposure of men with PbB levels of 40 to 50 ug/dl also appears to result in altered testicular function.

<u>Carcinogenicity</u>

Several studies have reported renal tumors in Wistar rats following ingestion of high doses of a lead salt (lead acetate). Lead subacetate (another lead salt) has produced benign tumors (renal carcinomas or adenomas) in Swiss mice and seveal strains of rats, but not golden hamsters. Glimomas (CNS tumors) were also observed in many of these studies.

There have been a number of epidemiological studies which have assessed the mortality experience of lead-exposed workers. In some of the studies, no excess cancer mortality was observed. In one study, non-statistically significant excess cancer mortality of the respiratory system and cancer of the digestive organs and peritoneum was reported which on evaluation by other statistical techniques by another investigator was reported to achieve statistical significance. Another study has reported increased mortality from renal cancer among a group of lead smelting workers. However, this excess mortality, based on only six cases, did not achieve statistical significance. On review of all of these studies, EPA concluded that the absence of good lead exposure documentation made it difficult to assess the contribution of lead to the observed results.

The International Agency for Research on Cancer (IARC) has classified lead in Group 3, inadequate evidence for carcinogenicity in humans, sufficient evidence for carcinogenicity in animals (for some salts). EPA has classified lead in category B_2 (sufficient evidence in animals, insufficient evidence in humans) according to the Agency's Guidelines for Carcinogen Risk Assessment (EPA, 1986b). However, the Agency noted that the doses inducing kidney tumors in positive rat studies were beyond the human lethal dose, and several epidemiological studies have not demonstrated an association between lead exposure and elevated cancer occupationally exposed workers. Consequently, EPA has recently proposed to set an MCLG in drinking water based on noncarcinogenic endpoints (EPA 1985c).

Drinking Water Standards

The current EPA and drinking water MCL for lead is 50 ug/L. This limit was designed to limit PbB levels in 99.5% of the population to below 30 ug/dl.

NAS (1977) has stated that the current MCL, in view of other environmental sources of exposure, may not provide a sufficient margin of safety, particularly for fetuses and young children.

EPA, in agreement with this assessment, has recently taken the first step in lowering the MCL by issuing a proposed MCLG of 20 ug/L. This level was derived based on a target PbB level of 15 ug/dl for protecting children and infants, using a conversion factor of 6.25 to translate PbB to lead in drinking water (assuming a consumption of 1 liter of water per day) and an uncertainty factor of 5 (EPA 1985c). After finalization of the MCLG, EPA would then factor in other data, such as technological feasibility, to establish a revised MCL.

ceiving HCB orally reported both fetotoxicity and teratogenicity (E:A 1985g). The effects noted in these studies included cleft palate, reduced fetal viability, reduced neonatal weight gain and reduced relative fetal weight (EPA 1987g).

Carcinogenicity and Mutagenicity

Lifetime animal carcinogenicity studies have revealed that HCB elicited statistically significant increased tumor incidences in rats, mice, and hamsters. Based on these data, EPA has placed HCB in its carcinogenicity category B_2 as a probable human carcinogen.

Drinking Water Standards and Criteria

EPA has not developed a drinking water standard for HCB. The EPA one-day and 10-day and longer health advisories (HAs) for a 10-kg child are each 50 ug/L. The longer-term HA is 175 ug/L for a 70-kg adult. The EPA reference concentration for a potential carcinogen risk of 1×10^{-6} is 0.02 ug/L.

Noncarcinogenic Effects

When toxicity information is considered for noncarcinogenic effects of substances, the data are evaluated based on their dose-related response characteristics and the establishment of an exposure level below which no adverse effects are observed. Historically, the observed threshold or no-effect level for lead-induced toxic effects has continued to decline as more sophisicated experimental and clinical measures are employed to detect more subtle effects. These include alterations in physiological functions at blood lead (PbB) levels below the currently accepted maximum safe level for exposure to children, a segment of the population currently regarded to be at highest risk of lead-induced effects (EPA 1985c, ATSDR, 1987j).

The most serious effects associated with markedly elevated PbB levels are severe neurotoxic effects that include irreversible brain damage. For most adults, such damage does not occur until PbB levels exceed 100 to 120 micrograms per deciliter (ug/dl). At these PbB levels, severe gastrointestinal symptoms and effects on several other organ systems are often found. Precise thresholds for occurrence of overt neurological and gastrointestinal signs and symptoms of lead exposure in cases of subencenpthalopathic lead intoxication have yet to be established, but such effects have been observed in chronically exposed adult lead workers at PbB levels as low as 40 to 50 ug/dl.

Toward the lower range of PbB levels associated with overt lead intoxication, less severe but important signs of impairment in normal physiological functioning in several organ systems are evident among apparently asymptomatic lead-exposed adults (EPA 1985c). These include:

- o Slowed nerve conduction velocities indicative of peripheral nerve dysfunction (at PbB levels as low as 30 to 40 ug/dl);
- o Altered testicular function (at PbB levels of 40 to 50 ug/dl); and
- o Reduced hemoglobin production (at approximately 50 ug/dl).